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NEWSPAPER

News Update

IBM Canada Sued In Patent Dispute

TORONTO – Xoma Ltd. has brought a patent infringement suit against IBM Canada Ltd. in the Federal Court of Canada here.

In its suit, Xoma, which started similar actions against Systems Dimension Ltd. and McGill University, asks the court to restrain IBM from selling or using equipment which uses the software it claims infringes on the Xoma patent.

In an official statement, IBM Canada said: "IBM Canada Ltd. believes that the Xoma claim is without substance. In our opinion, the patent relates generally to well-known and nonpatentable accounting techniques which have been widely used for many years by many computer users prior to Xoma's development.

Other news updates on Page 4.

"IBM has instructed its solicitors to take appropriate proceedings to have the patent declared invalid," the statement ended.

The goal of the suit, according to Xoma Vice-President William Solomon, is "basically to collect royalties on our patent."

The patented program is an accounting system, which separates data into individual transactions, classifies and stores acceptable items and rejects those which do not meet predefined standards.

The Canadian patent, No. 935,922, lists 27 claims for the program.

Montreal-based Xoma claims IBM infringement on three of these, including an error detection routine and implied posting.

"We don't want to stop IBM from using the software," Solomon said. "We don't want to inhibit the art; we simply want to collect the royalties."

IBM Canada has 30 days in which to respond to the complaint.

On the Inside This Week

Orange County FM Off to Good Start —*Page 10*

Synthetic Benchmarks Built From SMF Data —*Page 17*

AT&T's Datec Teams Solve Tougher Network Problems —*Page 20*

Seven-Fold Growth Forecast In Remote Terminal Market —*Page 37*

Communications 20
Computer Industry 35
Editorial 14
Financial 46
Societies 29
Software/Services 17
Systems/Peripherals 23

$61.9 Million Asked

User Suit Charges IBM 'Forced Upgrades'

By E. Drake Lundell Jr.
Of the CW Staff

PROVIDENCE, R.I. – A computer user here has joined the parade of people suing IBM on antitrust grounds.

Catamore Enterprises, Inc., a jewelry manufacturer here, charged in a counterclaim filed in Federal District Court that IBM "engaged in a program of coordinated and systematic induced upgrading of customer equipment" in violation of the Sherman and Clayton antitrust acts.

Furthermore, the suit said, IBM "instigated and instructed its salesmen and marketing personnel to recommend and assist in the implementation of inferior computer systems in order to acquire customers with the plan of subsequently enticing said customers to lease or purchase more sophisticated computer equipment."

Catamore, the suit said, originally contracted for a 360/20, was later sold a 360/25, then told it needed a 360/30 and finally told that a 370/135 would meet its needs – all in a four-year time span.

The $61.9-million counterclaim charged IBM with fraud and breach of contract in addition to the antitrust claims.

It was filed on May 9 in response to an IBM suit against Catamore filed on October 25, 1972 seeking to collect $68,453 in back rent allegedly due IBM from Catamore.

IBM said it had filed papers opposing the Catamore motion to amend its counterclaim "because we believe it is without merit.

"The motion is currently under consideration by the court and will be dealt with at the court's discretion," IBM added in a statement.

In the Beginning

In late 1967 and early 1968, the suit alleged, IBM discussed with Catamore a computer system to assist the firm in production management, order processing and inventory control.

IBM agents, the suit said, professed IBM's "expertise in areas of manufacturing applications and accounting systems which uniquely qualified" IBM to supply Catamore with "a computer system . . . to the exclusion of all competitors" of IBM.

IBM proposed a 360/20 to handle the work of Catamore, the suit said, including the processing of 2,000 raw material inventory types, 6,000 finished items, 300 collection items and 500 to 750 special orders daily.

However, Catamore charged IBM "knew or had reason to know that the aforesaid representations . . . were false, that in fact no accurate prediction could be made at that time as to the capability of such a planned totally integrated computer system."

In addition, Catamore charged, IBM "knew for a fact that the difficulties,

(Continued on Page 2)

Interconnection Conflicts Preserve Monopoly: FCCer

By Ronald A. Frank
Of the CW Staff

NEW ORLEANS – Despite Bell System complaints about the dire economic consequences of competition, AT&T has "indeed fared very well in this new competitive environment," according to Walter Hinchmann, recently named chief of the common carrier bureau at the Federal Communications Commission (FCC).

Speaking on a panel at the annual conference of the International Communications Association (ICA), Hinchmann said a look at the earnings of the Bell System shows a boost of 13% for 1973.

Users are benefitting from the new environment, the phone companies are enjoying record earnings and the specialized carriers are introducing innovative services. So there should be no need for the many regulatory challenges to competition and interconnection that now face both the FCC and state regulatory commissions, Hinchmann suggested.

Other ICA coverage on Pages 6 and 7.

'Fierce Wars'

But past regulatory conflicts and "fierce competitive wars" have caused the phone companies and state regulators to band together to protect the status quo, the FCC official told the attendees.

CW Photo by Ronald A. Frank
Walter Hinchmann

"The status quo in the telephone industry is enshrined in the concept of the natural monopoly," Hinchmann said.

Responding to claims that products from noncarrier suppliers and services from new carriers will adversely affect the average residential telephone user, Hinchmann said the rate and services "for the little old lady in tennis shoes" will feel little impact from these new developments.

Nevertheless, the economic ramifications of interconnection are very real and that is why the FCC has issued a notice of inquiry to explore these issues in Docket 20003, he said.

Describing this upcoming proceeding as a major undertaking, Hinchmann urged

(Continued on Page 4)

Telex/IBM Suit Arguments End; Each Side Rehashes Old Charges

By a CW Staff Writer

OKLAHOMA CITY, Okla. – IBM and Telex essentially traded past arguments in this dusty oil town last week during what was probably the last stop in their two-year-old litigation.

IBM, for its part, told the Tenth Circuit Court of Appeals here that the lower court's verdict, which found IBM guilty of monopolization, could not be supported by the facts in the case and argued for a complete reversal.

Telex, meanwhile, argued that the lower court finding was correct, but that the penalty levied against IBM should be even larger than the $259.5 million awarded in the lower court.

The arguments are likely to be the last in the case – the first in 40 years in which IBM was found guilty of monopolization, lawyers sitting in on the case said last week. This is because the Supreme Court will probably not review the case after a decision here since it is aware it will probably be called on eventually to hear an appeal of the government suit against IBM, they indicated.

IBM cedes documents to Justice. See story on Page 35.

In This Corner . . .

The decision against IBM should be overturned, said Thomas D. Barr, IBM's lead courtroom attorney from Cravath, Swaine, and Moore, because the facts in the case "establish overwhelmingly that IBM did not have monopoly power," and because those facts "clearly establish" that all IBM's actions were legitimate.

Barr, who called the lower court decision "novel," "perverse" and "unusual," charged that Judge A. Sherman Christensen erred in his definition of the market, how he measured the market and how the court used those market measurements.

Barr charged it was unusual to limit a

(Continued on Page 2)

Cambridge Has H2000 Add-On; Court Fight Set

By Vic Farmer
Of the CW Staff

CONCORD, Mass. – Cambridge Memories, Inc. (CMI) has announced a line of add-on core memories for Honeywell 2000 series computers, and has already gone to court in an effort to force Honeywell to maintain its part of a mixed system.

Honeywell has refused to maintain its part of a mixed system in this first effort by an independent to offer users add-on and extended memories for the H2000 series.

CMI's 2000/Stor add-on memory is priced at 70% of Honeywell's equivalent

(Continued on Page 2)

User Monopoly Suit Charges IBM 'Forced Upgrades'

(Continued from Page 1)

costs and time necessary for implementation of such a system could not be guaranteed at that time," but nevertheless IBM "so guaranteed such items to the defendant."

The suit also alleged IBM stated the computer system could be installed with only minimal training for the Catamore personnel, even though IBM "knew or had reason to know that such an undertaking as the installation and implementation of a totally new integrated computer system would require the hiring and training of expert personnel in that area."

Furthermore, the suit alleged, "it was not necessary" for Catamore "to have an integrated computer system as alleged by" IBM and "by reason of the preparation for such an integrated computer system, various internal functions which the defendant had performed satisfactorily were jeopardized and filed."

$3.8 Million Loss

Catamore had planned to expand its business based on assurances from IBM that IBM "knew or had reason to know were false," the suit said, causing it to lose profits amounting to $3.8 million.

In addition, the suit charged, IBM "unbundled" in the middle of the contract period with Catamore – a "radical departure" for IBM – and the unbundling was "a repudiation of an integral provision of the contract between the plaintiff and defendant."

Furthermore, Catamore said, IBM told it later that the 360/20 would not be large enough after all for its needs and therefore Catamore entered into a new contract for a 360/25 system which greatly increased its costs.

But the system never worked, according to Catamore, with problems including failure to provide month-to-date and year-to-date totals on daily salesmen order reports, invoices with incorrect billing charges, "failure to adjust appropriate accounts on credits and returns of merchandise, failure to calculate overshipment by suppliers of raw materials, . . . failure to remove unwanted or discontinued or obsolete records from the computer files, omission of monthly sales and cost totals on a year-to-date report, failure to report inventory on hand and location, and failure by [IBM's] personnel to provide appropriate documentation for implementation of programs."

> *IBM agents professed IBM's "expertise in areas of manufacturing applications and accounting systems which uniquely qualified" IBM to supply Catamore with "a computer system . . . to the exclusion of all competitors" of IBM. – Catamore Suit.*

The suit also charged programs originally written for the 360/20 had to be converted for the 360/25 and "this conversion effort did not bear results and programs had to be completely rewritten and new programs had to be written."

Because of the confusion and the inability of the system to function as promised, Catamore said it "suffered the destruction of the reliability of its business records and reports, invoices, purchase orders and other vital documentation."

Then, the suit charged, IBM said the work could only be done on a 360/30 computer and later recommended Catamore move up to a 370/135 system.

IBM "intentionally misled" Catamore into believing all the problems with the system were caused by Catamore personnel, the suit charged, in order to get Catamore to order "more sophisticated and still more expensive computer systems."

Furthermore, Catamore charged, IBM has "greatly restrained trade within the data processing industry" in violation of both the Sherman and Clayton antitrust acts.

Final Arguments Heard in IBM/Telex Appeal

(Continued from Page 1)

case like this to a four-year period (1969 to 1972), and under questioning, he suggested the proper time period against which to measure IBM's market share was the "past, present and future."

The court gave no justification at all for the limited time period, Barr said, indicating such a move was "without precedent and contrary to Supreme Court teaching."

He said limiting the relevant market to peripheral equipment attached to IBM systems was wrong and was contradicted by the facts in the case.

However, in counter argument, Floyd Walker, the lead Telex attorney – in what many felt was his best performance yet – contended the market defined by Christensen accurately reflected the reality of the marketplace at the time under consideration.

While Barr contended the other mainframe makers should have been included in the market definition, one of the appeals judges pointed out that the other firms did not react to IBM pricing moves as the independents had.

Other Tests

But even while knocking the share-of-market figures used in the decision (which had been largely based on IBM figures), Barr also said "share figures" should not be the "conclusive factor" in such cases, arguing that the court should have looked closer at the ease of entry into the market and other traditional tests of antitrust violations.

However, under questioning he admitted many who had entered the market later dropped out, but he claimed more entered than left. One judge pointed out, however, that entry itself was not that important if it was not "effective entry."

Arguing the second part of the IBM case, IBM counsel Nicholas deB. Kazenbach, former attorney general, argued that even if IBM held a dominant market position, none of its acts was illegal.

The antitrust laws, he lectured the court, do "not prohibit price competition," and even if the Telex market definition is accepted there is nothing to prohibit price cuts by the dominant firm.

The district court, he said, adopted a "novel and totally unprecedented view" of the law since it found price competition to be a predatory practice.

If the IBM price actions criticized were non-discriminatory and still produced a profit, he said, then they cannot be held to be predatory, even if the firm knew others would be hurt by the moves.

While "we knew what we were doing," he said, legal price competition could not be held wrong if the price cuts were not below cost.

However, Walker indicated IBM had reduced prices only in those areas where there was competition but had raised them in the mainframe area to make up the differences.

In addition, he contended the computer industry was essentially a continuation of the data processing market that had previously been dominated by IBM.

Because the market is a lease market – largely established that way by IBM – he said there were tremendous risks to entrants that made them "vulnerable to actions such as IBM's."

He said IBM specifically zeroed in on the independent peripherals firms and learned where they were "vulnerable to IBM pressure" and then set out to apply that pressure.

The IBM moves such as the 2319 disk drive, fixed-term plan and extended-term plan caused the independents to lose money on the equipment they shipped so even if sales went up they suffered, Walker said.

Clarifications

To correct any mistaken impressions resulting from stories or our photo feature of last week, the following items should be noted by readers:

The chairman of the 1975 National Computer Conference is Donal (not Donald) Meier.

Bernard Galler is an ex-president of the Association for Computing Machinery (ACM), but has not held the position of president of Afips.

In our photo feature, Pat Ward is standing (it's Patrick, not Patricia).

California to Purge Selected Crime Files

CW West Coast Bureau

SACRAMENTO, Calif. – The State Attorney General has begun a $5.2 million program to purge certain criminal files of the California Department of Justice (DOJ).

It is expected that the purge will reduce the files by about 50% and that other law enforcement agencies in the state will start similar programs.

Deputy Attorney General Michael Franchetti said almost all of the records to be purged are in manual files, since new computerized files chiefly contain data the department wishes to retain.

"Our main goal has been concern for rights of the individual," he said, although he added that the purge will increase the DOJ's efficiency.

The purge includes records of offenses not of statewide importance and minor and nonspecific offenses such as disorderly conduct and driving without a license.

Cambridge Has H2000 Add-On

(Continued from Page 1)

unit prices, but CMI add-on memory can double the storage capacity over the Honeywell limit on some models of the H2000 series.

Putting Honeywell on the spot, CMI recently filed suit charging restraint of trade by Honeywell and sought an injunction in the Middlesex County Court, Cambridge, Mass., to force Honeywell to maintain its part of any system with CMI add-on memory.

The injunction was denied, and the hearing date for the suit itself has not been set. CMI charged Honeywell was shutting them out of a potential market.

Remembrances of Times Past

Just over two years ago this same type of conflict arose between IBM and Itel. In that case, IBM relented and agreed to provide maintenance.

Since then, independent memory makers requiring minor wiring changes in an IBM CPU have incorporated a switch arrangement to restore the original configuration of the mainframe for diagnostic purposes. This switch served to electronically shut out the extended memory.

The 200/Stor memory series can be attached to 12 of the H2000 Series systems including the models 1200, 1250, 2200, 3200, 2070 and 2050A.

CMI claims both the storage medium and interface technology used in the add-on memories are directly compatible with the memory organization used by Honeywell in that company's M-9 memory modules for the H2000 Series. But Honeywell counterclaims it cannot rely on its diagnostic techniques because it is not yet sure of how the system will react with the add-on memory.

Interconnection of the 2000/Stor to a Honeywell system requires attachment of four cables and "very minor CPU modification," according to CMI.

CMI also claimed all Honeywell software, diagnostic routines and hardware attachments will run without alteration.

The CMI add-on memories have capacities of 64K, 128K, 256K or 512K characters. There is already one test installation and other deliveries will start in June from the firm at 696 Virginia Road, 01742.

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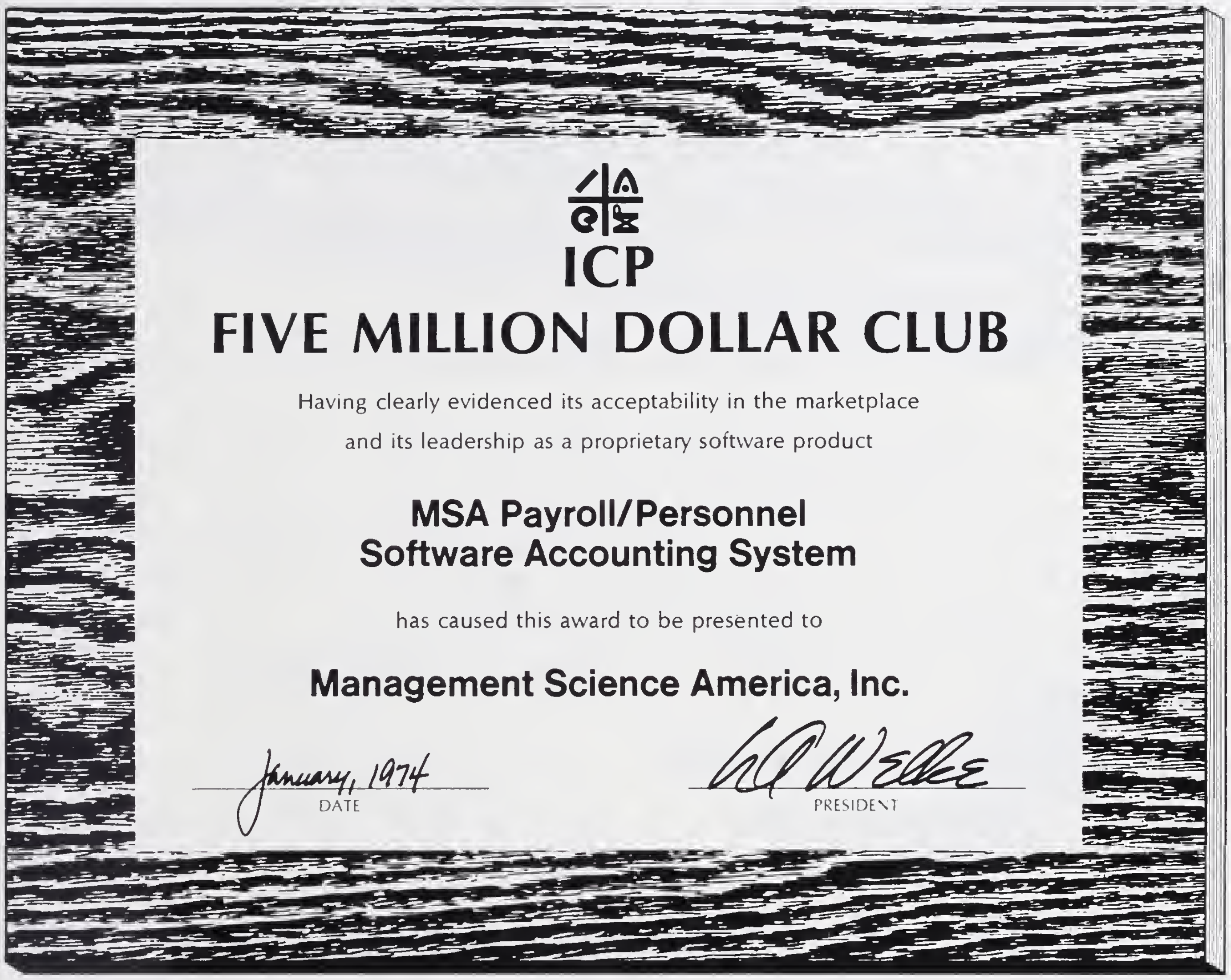

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'Enthusiastically Accepts' Ford Invitation

Afips Board Rejects Washington 'Interface' Plan

CHICAGO – The Board of Directors of the American Federation of Information Processing Societies (Afips) has rejected a proposed Information Processing Board to interface with governmental personnel and ordered Afips President George Glaser to come up with a new proposal to establish a Washington, D.C., presence.

But at the same time, the organization approved a letter to Vice-President Gerald Ford "respectfully" acknowledging and "enthusiastically" accepting his invitation to work with his Domestic Council Committee on the Right of Privacy.

As a first move in this direction, the board approved sending the Ford council transcripts of all the sessions dealing with privacy at the recent National Computer Conference and authorized officers to hold informal discussions with the council on the issue.

The Information Processing Board proposed to work with government agencies would have been made up of the presidents of the constituent societies in Afips along with other interested parties and it would have met occasionally with government agencies interested or involved with computer questions.

It would also have been used to help define government-related problems and to establish a structure for a proposed Washington, D.C., office.

However, most board members felt the move would not have ensured enough of a Washington presence for the organization on a working level.

'Where to Start?'

Tony Ralston, ACM president, led the move against the Information Processing Board by noting "it is difficult to know where to start opposing" the measure.

He noted that Glaser had been charged with setting up a committee to establish a Washington information office – a charge which had not been met with the present proposal.

While he noted there were many uncertainties with such a move, most of the facts supported the establishment of an information center in Washington.

The Computer Science and Engineering Board of the National Academy of Science collapsed from lack of interest, he noted, adding that the same thing might happen to the proposed Information Processing Board.

D.C. Operation Vital

In addition, Ralston said the Afips organization and the Afips president should be vitally interested in a Washington operation as "one of the most important things he can do."

Glaser contended he was vitally interested in the subject and not "pussyfooting" about it at all.

After the Information Processing Board was voted down by a wide margin, the board then charged Glaser with establishing a Government Liaison Committee which should make proposals regarding a Washington operation in time for the next board meeting in November.

In defeating the proposed Information Processing Board, the Afips group made it clear, however, that it was not against a Washington, D.C., operation, but rather that it favored a stronger operation than would have been provided by the proposal.

Interconnect Disputes Perpetuate Monopoly: FCCer

(Continued from Page 1)

users to get involved and participate.

Why Them?

Representing the state regulatory point of view, Hugh Wells, commissioner of the North Carolina Utilities Commission asked why the FCC "should be trusted with finding the answers to the interconnect puzzle.

"The states and not the national government have been the prime movers in bringing basic telephone service to the people of our country. And the history of the FCC's record on interconnection reflects more indecision than purpose and more guesswork than information," Wells charged. "No one in this country can tell me today in meaningful terms what the impact" of interconnection will be on services and rates.

Also speaking about the regulatory process on a national level, Sebastian Lasher, program manager in the President's Office of Telecommunications Policy (OTP), said most innovations are introduced by vendors without proper evaluations of users' needs.

"We know almost nothing about customer preferences, Lasher said, "the extent and nature of customer demand for specialized or customized services, or even how the market for data services differs" from others.

"A prominent communications firm advertises, 'We hear you.' Unfortunately we in government often have to admit: We don't hear you," Lasher told attendees.

But the Bell people have "not been very convincing" in telling government specifically and precisely what they hear, he added.

To correct the communications gap between government and users, Lasher told attendees "you can speak with your dollars" to support vendors who have useful products and services. "You must intervene and speak directly to the court or commission" in regulatory proccedings but "you must prepare a tightly reasoned case with carefully selected facts to support [why your argument] is in the public's interest – not just your firm's interest," Lasher advised.

News Update

Judges Fail to Halt Computerization

PARMA, Ohio – Two municipal court judges here have lost another round in their effort to prevent computerization of court records [CW, Jan. 23, Feb. 20].

Judges George Spanagel and Gertrude Polcar had filed for a stay of execution to halt Clerk of Court Walter Shipka's computerization program until there is a decision on their appeal.

The two judges had filed a court order last November halting Shipka's two-year-old program, which includes an alphabetical listing of cases; a daily traffic docket, listing the names of those scheduled to appear in court; open warrants, listed alphabetically and geographically; and a criminal disposition docket.

The two judges specifically charged that Shipka had failed to maintain parallel manual records of criminal dispositions, even though the computerized version had not yet received approval as the official record.

They claimed the attempted computerization caused "great inconvenience, didn't do what it was supposed to do and was in questionable compliance with legal requirements."

But Shipka took the judges to court on the issue, and won the right to continue with his automated program.

The judge in the case found that Shipka's program was ". . . of great assistance to the operation of the Parma Municipal Court," and that the two judges had failed to prove Shipka had not kept records as required by law.

However, the judge ruled that Shipka should keep hand-posted, parallel versions of computerized records until the automated system receives official approval.

Subcommittee Votes to Cut IBM/Teale Contract by 20%

SACRAMENTO, Calif. – A state senate finance subcommittee here has voted to cut the Teale Consolidated Data Center contract with IBM by about 20%.

Senate Finance Subcommittee Number 1, accepting recommendations contained in a critical report of the conversion of the system, voted to cut $3.1 million out of the $19.9 million contract – action which now has to go to the Senate Finance Committee and on to the senate as a whole and the state assembly.

The report, which cited delays in the conversion of the real-time portion of the Department of Motor Vehicles computer system, called for the cuts because it said some of the planned conversions for the system could no longer be economically justified.

Meanwhile, it has been learned that IBM has called in Brandon Applied Systems' RTP Division to help it complete the delayed work on the DMV system. Further hearings will be held this week on the entire contract before the Assembly Ways and Means Committee.

State Trade Secrets Laws Upheld by Supreme Court

WASHINGTON, D.C. – The Supreme Court has overruled a lower-court decision and upheld the validity of state trade secret laws. Most computer programs are protected under the trade secret statutes.

The lower-court decision, which was reversed, had held that trade secret statutes didn't protect work that could have been patented. The original case was brought by Kewanee Oil Co. against four former employees.

The vote was 6 to 2.

In the majority opinion, Chief Justice Warren Burger said, "Congress, by its silence over these many years, has seen the wisdom of allowing the states to enforce trade secret protection.

"Until Congress takes affirmative action to the contrary, states should be free to grant protection to trade secrets," he added.

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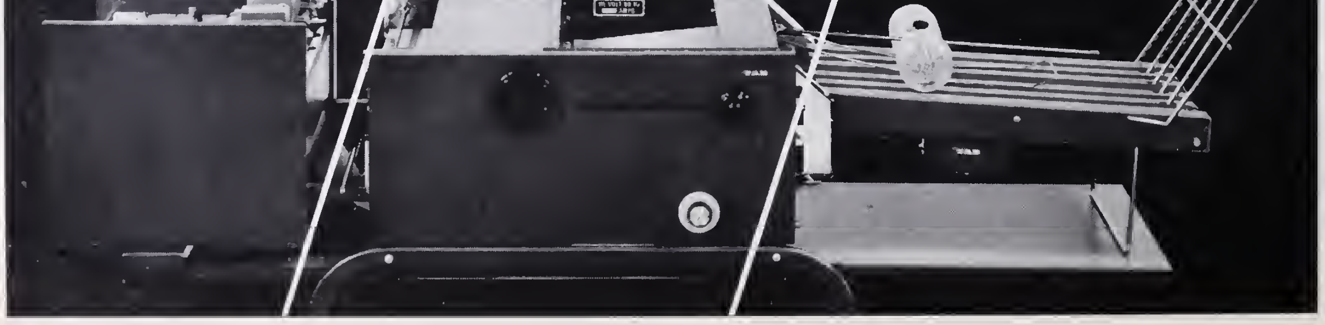

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Communications Users Troubled by Future Services

By Ronald A. Frank

Of the CW Staff

NEW ORLEANS – User uncertainty about emerging carrier services and how they will affect existing networks cast a long shadow on the annual conference of the International Communications Association (ICA) here.

CW at ICA

A continuing parade of panel sessions throughout the week-long conference dealt with the plans of existing carriers, international carriers, satellite carriers and specialized carriers, and the telecommunications users attending waited for signals on what to expect next.

Despite the glowing comments from panelists, few answers were forthcoming on such major issues as the increasingly fierce competition between the established and specialized carriers, the interconnection of noncarrier equipment, and the impact of Bell's new services such as the Dataphone Digital Service (DDS) and the high/low private line plan.

Milestone Reached

But the 500 ICA members attending were nevertheless optimistic about the increasing importance of telecommunications management within their own companies. A new milestone was reached when several users gave firsthand accounts of their experiences with specialized carrier services from both MCI and Datran. The cost savings and quality of these facilities were praised although the number of users willing to take a few channels on a trial basis is still limited.

Domestic satellites seemed almost within reach as Russell McFall, president and board chairman of Western Union, told attendees the new Westar satellite "has created a futuristic 45,000 mile shortcut from coast to coast" for data and other services.

WU Vice-President Harold Johnson told the conference that Westar I, launched last month, "is precisely on scheduled course," and services will begin in late July after a backup satellite is launched in June. And "error rates will average at least an order of magnitude better than terrestrial transmission," he promised.

Membership Rising

Frank Burns of 3M Co. and outgoing ICA president told attendees as of May, member companies in the organization had risen to 338 with the number of voting and alternate members set at 828.

But Burns said only 82 members had participated in ICA activities for a "shocking all-time low of 11% involvement." He called for a "massive injection of effort from our members to put vigorous life into the tired body of this association."

Despite this poor participation, Burns related the ICA accomplishments of the past year which included a telecommunications scholarship at the University of Colorado and a two-week seminar at the same school, the establishment of the first ICA office at Mundelein, Ill., and an interim seminar between annual conferences held this year in January in Las Vegas.

Martin Fullerton of Alcoa was elected president, while Robert L. Underwood of Kaiser Aluminum & Chemical Corp. was elected to be first vice-president. The post of second vice-president went to Raymond Reamer of IBM.

'Vendor' President?

Reamer's new position caused considerable speculation among conference attendees since election to the ICA presidency is usually a foregone conclusion based on holding an established sequence of offices. If this sequence is followed, Reamer would become ICA president in two years after Underwood has left the user organization.

Some attendees openly speculated that the strict user orientation of the ICA would never allow an employee of a major supplier like IBM to be president. But others pointed out that the line of succession to the presidency has been firmly established and has almost never been altered.

Fullerton was not available for comment on what plans he has for ICA during his upcoming year in office. Next year's conference has been set for May 11-16 in San Francisco.

Synchronous Bell Display on Horizon?

NEW ORLEANS – The Bell System apparently will introduce a synchronous version of its Dataspeed 40 display within the next year.

The new model was hinted at by Bell spokesmen at both the ICA conference here and the NCC in Chicago. At ICA, Carl Stuehrk, AT&T's director of data and intercity service, told attendees development work is proceeding on revisions to the Model 40 and new versions will be introduced "in the not-too-distant future."

In Chicago, a Teletype Corp. spokesman was more specific. He revealed his company is working on modifications to the interface board within the controller of the CRT system. He said the synchronous model will probably be introduced next spring. And since it will include more features than present asynchronous models, the new unit will be higher priced.

Bell's recent tariff fling for its Dataphone Digital Service (DDS) included most Teletype Corp. machines except the Dataspeed 40. It is believed one of the new models will be a 2,400 bit/sec CRT for use with the DDS service. It is possible that the synchronous version would handle binary synchronous data, but a Bell spokesman said he could not comment on this capability.

But That's Assuming...

NEW ORLEANS – During the question and answer period at an ICA session here, a user asked Sebastian Lasher of the President's Office of Telecommunications Policy (OTP) whether current White House problems had affected the direct leadership of OTP. Lasher replied that the relationship between OTP and the White House, including how each interacts with the other, was probably not a proper subject for public discussion.

At this point, another government official asked half-jokingly why the user assumed there was any interaction or leadership even in "normal" times.

Whatever happened to the checkless society?

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Find Success With MCI, Datran Links

Users of Special Carriers Realizing Promised Savings

NEW ORLEANS – User experiences with specialized common carriers was the topic of a session at the annual conference of the International Communications Association (ICA).

Appearing on a specialized carrier panel with representatives from Datran and MCI, David Milton of SCM Corp. told attendees his company's experience with MCI circuits has resulted in a decision to use "specialized common carriers whenever their service meets our requirements."

And experience with Datran circuits was related by David Hartley, manager of corporate telecommunications at Anderson Clayton & Co. Between Dallas and Houston, the company had five dial tandem voice lines, four high-speed data lines and three teleprinter circuits. This entire package was on a Southwestern Bell Telpak A facility and cost $4,370/mo, Hartley said. Datran lines are expected to save the company 29% compared with Bell.

Sample Was Convincing

Describing SCM's tandem dial network which is used for data transmission during evening hours, Milton said a decision to sample a few MCI circuits between Chicago and Cleveland was made after careful evaluation of an MCI proposal.

"After analyzing and checking [MCI's] figures, the way they priced their circuits, and calling several fellow ICA members and discussing their experiences with MCI," SCM decided to go with the specialized carrier for a group of trunk circuits, Milton told the conference attendees.

The facilities to be replaced were nine Bell circuits between Chicago and Cleveland, "primarily due to the high cost of using AT&T," the user said. In its proposal MCI had stated it could save SCM $15,000/year by replacing the nine circuits, he said.

It was decided the MCI lines would be installed in groups of three circuits at one-week intervals. There were delays of "several months" in introducing the MCI facilities because the telephone company in Cleveland would not permit MCI to switch the new lines to other circuits, to extension numbers or to off-net dialing trunks.

'No One Noticed'

On Nov. 3, 1973, MCI cut in the first group of three circuits. No one in the company was informed of the change in carriers except the communications supervisor in Chicago and the telephone supervisor in Cleveland, but the switch "went completely unnoticed," Milton told the audience.

In the following weeks, a total of 10 MCI lines was cut in and when the bill came in, the savings were as the proposal had predicted, he said.

Since the installation of the first MCI line a total of 15 trouble reports have been turned in. Of these, two were traced to Ohio Bell problems, 11 were caused by Illinois Bell facilities and two trouble calls were caused by MCI, Milton said.

As a result of the relative lack of troubles, SCM has asked the specialized carrier for a proposal to convert a total of 63 circuits and this change is now being analyzed.

The SCM data network operates at 2,000 bit/sec with Bell 201A data sets. And the net will be upgraded to a higher speed with Bell 208 data sets which are on order. The network interconnects about 75 SCM sites in the U.S. with three major switching centers in Chicago, Cleveland and Bethlehem, Pa. It has been in operation for about two and a half years, Milton said.

Replacement of the Anderson Clayton Bell lines with Datran facilities for the data and another specialized carrier on the voice lines will save $1,062/mo or $12,744/year, Hartley said. The conversion from the Telpak to the Datran lines allowed Anderson Clayton to divide its circuit in an innovative manner.

CW at ICA

A basic Datran 9,600 bit/sec channel will be subdivided into two 4,800 bit/sec data streams using a split channel data communications console provided by the specialized carrier. One 4,800 bit/sec line will connect to the firm's 3780 remote job entry terminal while the other will be interfaced with a time-division multiplexer for derivation of two 110 bit/sec channels and a 56.5 bit/sec channel. The remaining 4,500 bit/sec channel will be utilized to run IBM 3270 CRT equipment operating under IMS.

The 110 bit/sec lines will be connected using Bell DAAs to Model 33 ASR TTYs, and the 56.9 bit/sec line will operate with a Model 28 ASR TTY through a Bell 83B3 switching facility. The terminals located in Houston are connected over the Datran link and Bell local loops to a 370/158 in Dallas.

Connected to the 158 are 24 remote job entry terminals including a 360/20 operating at 9,600 bit/sec. The 158 runs under VS and both IMS and TSO nets will support the 3270 CRTs.

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Disputed Move to FM Has Propitious Start

By Marvin Smalheiser
CW West Coast Bureau

SANTA ANA, Calif. – A controversial move to facilities management (FM) by the Orange County Government appears to be producing significant savings as well as user acceptance after more than nine months of operation.

And with initial fears now laid to rest, the groundwork is being set for the rest of the seven-year, $25.9 million contract with Computer Sciences Corp., said to be the largest county FM contract in the U.S. The pact represents an $11 million savings over the bid proposed by the county's former DP division.

Orange County Update

The first half of a new Univac 1110 2x2 system has been set up for conversion, 437,000 tax bills were sent out on schedule in the first month of the contract, and a major on-line warrants system has been implemented without delays.

Almost all of the computer personnel previously employed by the county have been hired by CSC and training programs have begun to upgrade their skills.

Stormy Genesis

The contract was signed after months of debate over the purchase of equipment as well as FM. In the end, two supervisors voted against FM and a Grand Jury wanted more study before anyone put any ink on paper.

Yet today, while there are still reservations about how the full, seven-year contract will work out, key county leaders seem satisfied with FM so far.

A spokesman for Ronald W. Caspers, one of the supervisors who opposed the contract, said, "From what we can see, it appears to be working and working rather well. It is still early. We will have to wait and see."

A more enthusiastic response came from Robert L. Citron, tax collector-treasurer and a heavy user of computer services, who said the difference between the former county operation and facilities management is "the difference between the dark ages and the 20th century.

"The service is better and the quality of the product is better."

Frank Murray, FM project director for CSC, echoed Citron's statement, saying he has found high acceptance by users.

Those problems that have occurred, such as the initiation of CSC's own development standards, have been worked out amicably, he said.

One of the first problems faced by CSC after signing the contract was personnel. Three personnel and management teams were standing by when the contract was signed to interview the 127 county people made available to CSC.

CSC accepted 125 and since then the staff has grown to 155. The turnover rate has been 11.5%.

"One of the major potential problems," Murray said, "was morale. One of the things we did was develop a management development seminar and we have recently instituted an advanced systems concepts seminar.

"During the past eight or nine months we have concentrated on fostering a feeling of professionalism. We have given programmers separate work areas and their own phones and painted work areas.

"I plan to chat with every individual in the center to get to know them and find ways to improve the environment," he said.

Murray said when CSC first came in, none of the managers had been through even an elementary management training program.

"During the first quarter we immediately implemented a training program for all managers and supervisors, using a management specialist from UCLA."

Another training program is under way for the new Univac system.

Reaching the People

The user/management interface was another area of concern for Murray, and procedures were published to cover various aspects of communications. Situation bulletins were set up so users could call attention to their problems.

Procedures were also set up for requesting new systems as well as for change controls.

Fears about preserving the integrity of election secrecy was one of the issues brought up during the FM debate, but Murray said the problem has been resolved. Votes are counted in a separate facility by the county, summarized into punch cards, duplicated and then sent to the center.

"We have a rigid logging and control procedure and two representatives of the major political parties observe while we send the cards through our system," Murray explained.

"Every safeguard that can be taken is taken," he said, adding, "I believe there is less risk because of the attention that is focused on a private company."

Frank Murray

General securitv was also a

(Continued on Page 11)

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County FM Finds User Acceptance After Many Debates

(Continued from Page 10)

prime concern in the controversy over signing a facilities management contract.

So far, Murray said, a number of precautions have been taken, including badges for computer room personnel, a security officer and a form filled out by employees to acknowledge their awareness of the proprietary nature of the data they work with.

CSC is also preparing a special report to the county regarding security and backup computer procedures.

CSC serves all 33 county agencies in a county and provides service to 25 city police departments regarding criminal offenders and traffic offenders.

Organization of the department has been modified to provide separate managers for the criminal justice information system and administrative and property systems.

The criminal justice information system uses 30% to 40% of all developmental and operational resources, Murray said.

There are also managers of quality assurance, finance and administration, operations and conversion.

The FM contract sets a fixed price for services. If the county wants to do something that is not included, the contract can be broadened or something can be substituted.

One From Column 'A' . . .

Murray said there is a list of substitute values for each system. "If they do not want one system and do want another, we can use these values for substitution," he said.

Interpretation of a section of the contract concerning modification and enhancement of systems was a problem for awhile. There was no clear understanding of a section regarding payment for changes to a system beyond a level involving more than 20% changes in the code of a program, Murray said.

It was not clear whether the 20% related to cumulative changes or 20% for each program. Through negotiations and discussions with contract administrator Howard Dix, it was agreed to change the clause to specify a level of effort as the criteria for changes in programs and enhancements.

As long as the changes to programs could be made within the level of effort of CSC's personnel, then regardless of the number of instructions required, CSC would do it at no extra cost, it was agreed.

Equipment changes are progressing smoothly, Murray said. The Univac 1110 1x1 was turned over to CSC in March and the second half will be implemented by next January.

The new Univac mainframes will replace two Univac 70/6s; all peripherals will be Univac equipment.

In February, CSC installed 10 Four Phase Systems key-to-disk units, replacing 12 029 IBM keypunches and 056 verifiers. Four more key-to-disk units will be installed in the auditor controller's department.

"We anticipate a 20% to 30% improvement in throughput over the card machines," Murray said.

CSC, he said, had an advantage over a county-operated computer center in acquiring the equipment because "we could act immediately. We didn't have to go to the county to ask for funds. When we want to move we can."

It was, in fact, a dispute over funds that resulted in the current FM contract. The dispute concerned the purchase of IBM equipment versus lower cost Univac equipment, which was said to have twice the computer capacity.

One of the alternatives, it was suggested, was for the county and outside firms to submit bids for the operation of the data services department over a seven-year period.

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Ancient Method Keeps Power On

LOWELL, Mass. – The closest most people get to a water wheel is in the pages of a history book.

But for a number of businesses and at least one DP center here, this ancient technology is proving to be more reliable than some current forms of high technology when blackouts and brownouts threaten.

National Community Services is one of a few Lowell companies that depend on power from 18 water wheels, electrically interconnected and tied into a local utility. The wheels – some of which were built in the mid-1800's – provide about 20 million kilowatt hours of power annually, and supply as much as 75% of the electrical needs of the companies they service.

"Even if a blackout shuts us down for hours or days, we still are able to use critical lights and equipment including our minicomputer," says Joseph Mendola, treasurer of NCS.

"There are a few unusual aspects that have to be considered when using water wheels since the water supply is more difficult to control, but that problem is solved by using voltage regulators.

"We've been using the [Basic Four Corp.] Model 400 system for almost a year," he said.

"Unlike a lot of other types of computers, the Basic Four system doesn't require air conditioning to stabilize its operating temperatures," explained Mendola.

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Editorial

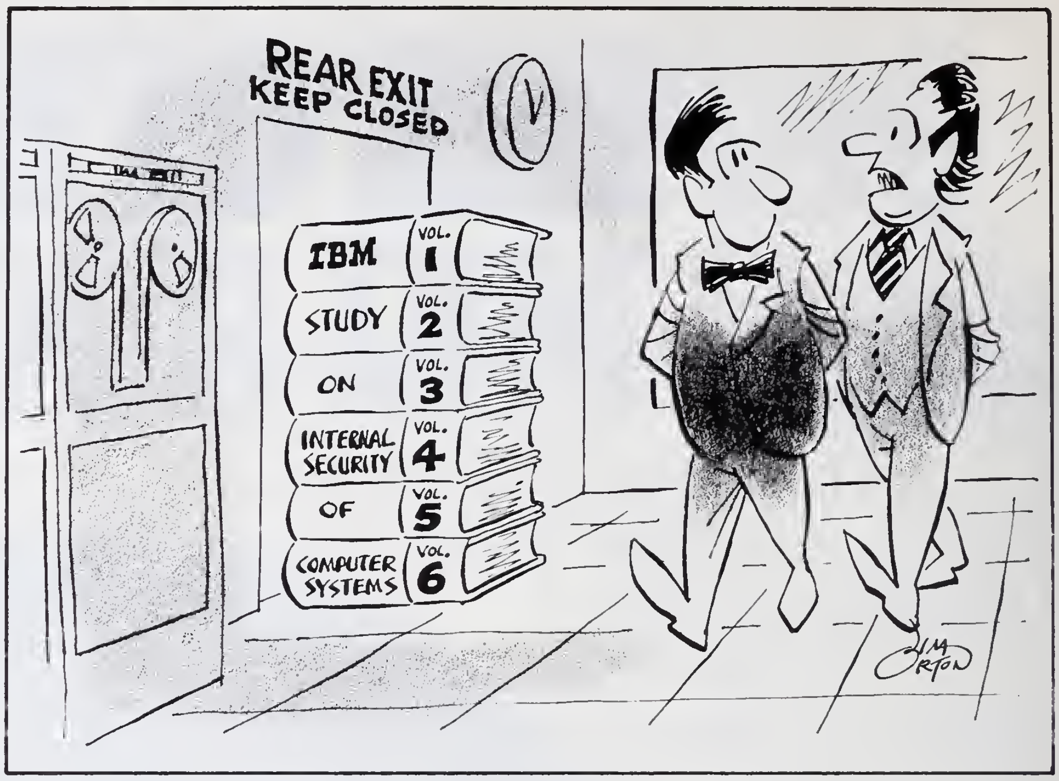
Privacy Progress?

The privacy problem is far from solved, and a statement made on stage during the National Computer Conference exemplifies the reasons progress is slow.

One speaker advocated public notice about the existence of data banks, in general, leaving the burden on individual citizens to inquire as to whether they are subjects in those files.

It is unrealistic to expect the average citizen to read all the public notices or subscribe to the Federal Register or whatever medium would be used to promulgate the existence of files.

A central clearinghouse is truly needed, so that periodically every subject of a data file, manual or computerized, would be informed of the existence, nature and purpose of files. The fact that this would be a burdensome (though technically simple) chore should not deter industry from establishing such a center; it is part of the cost of doing business.



'When Are We Getting the Lock Fixed?'

Letters to the Editor

Secure Systems Lie With Decision Makers

While it is difficult to justify outright sabotage, I must confess to a feeling of amusement in the case of Bill Fellinger vs. the Oregon Legislative Fiscal Office [CW, April 24].

My inclination would be not to seek the resignation of Fellinger but to place him in charge of computer security! Methods for securing computer systems from unauthorized use have been known for years, and there can be no excuse for allowing a remote user the power to commandeer a computer other than the failure to implement them.

Is it reasonable to expect, especially in a university environment, that breaches of system security or stability, whether accidental or intentional, will not occur when no effort has been directed toward implementing protection mechanisms?

I believe the prime responsibility for securing computer systems lies with the engineers, programmers and managers who build and operate them, and "decision makers" who procure inherently insecure systems against the advice of their own technical experts do a disservice to the computing community.

Gary A. Hill
Systems Programmer
Seattle, Wash.

Chicago

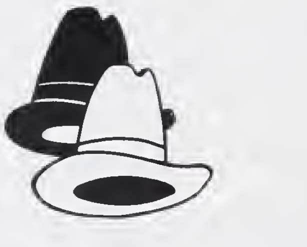
The Big Computer Scene is fun for the old timers: we all go, we get invited to the receptions and the hospitality suites, we have good quality (albeit expensive) accommodations; we're part of the action. And if you go to a major conference for a specific purpose – to look over the new miniprocessors, to give a technical paper, to attend an important committee meeting – you may not have as much fun as a veteran, but there is a focus to your expedition that compensates for the discomforts and the travel upsets and the money-money-money-money you spend.

But heaven help the novice! There were over *100* technical sessions at the National Computer Conference; over *800* exhibit spaces; a gaggle of flea-bitten buses running from hotels too expensive to stay at, past hotels too full to get into, to an exhibition hall too confusing to find the session you were looking for. And the paper you wanted to hear? Too little content to have been worth the struggle.

For me, a veteran of dozens of JCCs, scarred by Vegas and Atlantic City and far Anaheim, the high points were special ones: Paul Armer, inspired by the scramble to put up/take down/replace the Vice Presidential seal at The Ford Speech, posting a paper simulacrum at a session next morning lettered "Certified Vice Participant." Or the beautiful Blake quotation at the end of Professor Dijkstra's award acceptance at the Tuesday luncheon: "He who would do good to another must do it in minute particulars. General Good is the plea of the scoundrel, hypocrite and flatterer." Or a visit with Stu Crossman, proprietor of the Pratt & Whitney 701 and 704s, discoverer of Roy Nutt, and a lost Share co-founder.

The conference was a financial success. I hope it pleased the exhibitors. I know it pleased most of us veterans. It dazzled the freshmen and fatigued their spouses. On the intellectual side, definitely overblown: a third of the sessions and two thirds of the papers and panelisms were vacuous. This was the second NCC under the one-a-year rule, and the last one before DPMA comes into Afips. It was a good time to reflect on the change. Certainly one NCC is better than two Joints; *probably* one NCC is better than none at all. But New York and Chicago both were a long way from what we all want, veterans and novices alike: a warm annual gathering of the clan, with a few really important papers and panels, invited talks and keynotes with content, novel exhibits, convenient arrangements.

Huge, we have; great, not yet!



Herb Grosch

Dr. Grosch will attend four major international computer conferences, give a series of seminars in Japan, and revive the Polynesian Information Processing Society, before mid-June. Readers are requested to forward columns washed up on either Atlantic or Pacific beaches to the CW newsroom. They may keep the bottles.

A 'Nonperson' Replies

Having served in the military for 22 years, I must be one of Grosch's "nonpersons." ("The more profitable market is out among human beings" [CW, April 24].)

What, pray tell, do Calc, CPP and Jane Fonda feel the military should arm themselves with, orchids? Is it possible Grosch believes our defensive strength can be maintained, and our position as a world leader solidified, by denying the military access to all lethal weaponry?

The disgust I feel when the CPP, Calc, the SLA and the Grosches of this world demean the military, the people who serve it and those who support it defies description. In spite of Grosch's eloquent posturing, pot, permissiveness and passivism are not the keys to the kingdom. He would serve the country in a more meaningful way if he spent his time convincing his friends to free Patty Hearst rather than excoriating Honeywell.

R.E. Showalter
Sylmar, Calif.

...But RPG Is Here Now

Not to start the RPG/Cobol controversy again, but . . . I noticed two items on page 12 of the April 10 issue. One was an editorial urging implementation of Cobol on minicomputers so the user "wouldn't have to phrase his unique applications needs in Fortran or Basic." The other was a letter from Ken Opp indicating success in replacing an IBM System/3 with a minicomputer using RPG.

I certainly agree that Cobol will be useful when developed for minicomputers, but RPG is here now. My experience has been similar to Opp's. I ordered an RPG 310 minicomputer in late January from RPG Data Systems of Los Angeles.

During the month of February, the machine was installed and checked out (two hours) and by the end of the month nearly all of my 270 RPG II programs were running and our System/3 was returned to IBM. This included writing several CRT programs from scratch for on-line data entry and information retrieval.

Net result is similar to Ken Opp's . . . we're up and running on an improved system and saving at least 40% to boot. My application areas are property management, mortgage servicing, general ledger, and soon to be installed property & liability insurance agency system.

Richard Van Elgort
Assistant Vice-President and
Manager of Data Processing
Wallace Moir Co.
Beverly Hills, Calif.

Mini-Minis Left Out

Re the March 27 report on minicomputers:

Pages S/19 and S/20 contained a survey of 83 users of minicomputers. What I don't understand is why the article didn't differentiate between the small computer systems such as the NCR 50, Singer System 10, Basic Four, Burroughs B700-B1700, Honeywell 58, IBM S/3, etc., and the true keyboard-oriented miniature accounting computers.

The latter class includes the Singer Friden 5800-5900, Burroughs Series L, Phillips P-350, Litton EBS Series, NCR 299-399, Nixdorf and a few other miscellaneous manufacturers.

By including the System/3 the true minicomputer market is distorted. For example, it was noted that the average price of these small systems is $59,532. I know of no system in the *miniature* accounting computer class that sells for this much.

Another example is the percentage of the companies that do their own programming, which the article stated as being nearly 58%. For our own, and many of the competitive systems I'm aware of, this figure is more like 10% to 20%.

Bruce D. Milne
Zone Sales Manager
Burroughs, Inc.
Puerto Rico

(Other letters and viewpoints on Pages 15 and 16.)

Solving Social Problems by Computer – Part II

Ethically Undesirable Uses Often Born of Larger Evils

Viewpoint

The following is the second part of a series based on a speech given at the New York Academy of Sciences Oct. 9, 1973.

By Daniel D. McCracken

Special to Computerworld

There is a certain group of applications I consider ethically undesirable, either because they are a part of a larger venture of which I disapprove, or because there is no way they can be executed so as not to hurt people in some sense or other.

The classification system can be extended at this level to cover several types of reasons why certain computer applications are bad.

Some computer applications are bad because they are part of larger entities that are inherently bad, and which could not be done without a computer. A prime example is vote forecasting in presidential elections, which I believe ought to be stopped by Congress forthwith.

The problem is that of time zones. It is bound to happen sooner or later: there will be a really close election, which the computer will call in favor of Smith at a time when the polls are still open in the western states. Voters on their way home will hear on car radios that Smith is already the winner; why go out to vote for Jones? But computer forecasting is not perfect, and it will turn out that the California vote would have swung it to Jones.

Is that the kind of democracy we want? To ask the question is to answer it. A couple of hours' advantage in getting the results of an election held only every four years is not worth this kind of disenfranchisement.

Some systems are reprehensible on just about all possible grounds, whether done by computer or not. It has been widely reported that there exists some kind of federal data bank on people suspected of being disloyal, the existence of which is itself secret. I strongly endorse the position of the HEW Advisory Committee on Automated Personal Data Systems that there must be no personal data record-keeping systems whose very existence is secret.

Some applications are undesirable because they carry such high penalties for misuse. I think of the sickening situation a couple of months ago where an inexperienced bombardier failed to throw a switch on a bombing computer, and as a result a complete Cambodian village was wiped out with the loss of over 100 lives.

I have a similarly low opinion of the whole network of computer applications in Indochina, where "people sniffers" were tied into a lashup of half a dozen or so big IBM 360s, as a forerunner of the automated battlefield where killing will be done untouched by human hands.

Some computer applications are bad because they are premature, and cannot be done with adequate assurance that unexpected side effects will not destroy the benefits. One such situation is a fictional one, although it could be done in real life at almost any time: the story in Michael Crichton's novel *The Terminal Man,* where it was not predicted that the patient would come to desire the treatment for his problem of a special kind of epilepsy, to the point that it destroyed him.

That was fiction – but written by a former medical student, and I am told by a neurosurgeon friend that nothing in it would be especially difficult today. The computer aspects would not be difficult either, in one sense: the basic hardware and software could be developed in a year, more or less, without any breakthroughs required. But to do it safely – that is, with acceptable levels of risk that the system might break down – probably cannot be done for several years.

But the inevitability of technology being what it is, I would bet money that something very close to what Crichton predicted will in fact be attempted. I shudder to think how it may turn out.

Some computer applications are wrong because they actually add nothing to what was already known, but *seem* to naive observers to add certitude. I think of the Rand Corp. work cited by Frances Fitzgerald in *Fire in the Lake,* a study of the American involvement in Vietnam, where a laborious computer-based study of the political control of the hamlets came up with results that, according to Fitzgerald, could have been figured out by anybody with a history book and a map. But the results took on an added image of certainty "because the computer said so." U.S. policymaking seems to have relied heavily on such studies.

Study in Futility

Some computer applications are bad because, whatever one thinks of the applications of which they are a part, it is impossible in a practical sense to get the computer portion to work. I think, naturally enough in my case, of the Safeguard antiballistic missile system, which I spent the better part of a year traveling around the country speaking against.

I will not discuss the desirability or nondesirability of the ABM system in general, just as the 900 people who joined with me in the anti-ABM fight did not. What I claim, and what my colleagues joined me in claiming, was that all experience indicated the job could not be made to work.

In a nutshell, the problem was that computer software projects even much less complex than the extremely complicated ABM computer can only be brought to operational capability through an extended period of testing under actual operating conditions. Since "actual operating conditions" in this case would mean nuclear war, we doubted most strongly that the system could be made to work.

And if it wouldn't work, there was no real point to debate about how worthwhile it *would* be if it *could* be made to work.

Part III will discuss in detail one particular application – the Club of Rome project – a glaring example of the "computer says so" syndrome.

Daniel McCracken is the author of a dozen textbooks on computer programming and an observer of the social problems associated with computer technology.

Letters to the Editor

Education Survey Incomplete

The recent article by Dr. J. Daniel Couger in the May 8 issue does not do a satisfactory job of describing the audio/visual products available for data processing instruction. He has completely ignored the development plans of Control Data Corp.'s Individualized Education Services (IES) division. Although IES is relatively new into the marketplace, it is becoming a competitive force.

Control Data has committed well over half a million dollars for development of individualized multimedia courses. The development plans include exactly what Couger says is missing. In addition to a complete data base management system curriculum including "File Organization," "Data Base Organization," "Data Base Design" and "Management of a Data Base," IES is developing courses on IMS with plans for a course on Total. If Couger's survey of available audio/visual materials does not include these courses, one can only wonder about the validity of such a survey.

J.A. Komar
Manager, Modulearn Development

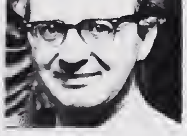
Control Data Corp.
Minneapolis, Minn.

Remote Testing Opens Opportunities for Programmers

The Taylor Report

By

Alan Taylor, CDP



Remote processing of operations at a service bureau has been practical for many years in small volumes. Now it is becoming economically preferable for some not-so-small users large enough to have their own computer systems in-house – and with the development of terminal-based data entry, programming etc., whole new ways of handling DP operations are becoming apparent, each with their own specialized technical problems for the DP manager.

Recently I ran into one case which exemplified the problems that come with opportunities.

John, the DP manager (and that wasn't his name) was talking about the computer system the company had on order – a Digital Equipment Decsystem-10. It was going to power a terminal network in the factory and sales areas of a manufacturing plant. As we talked outside the office, programmers and analysts were working away at terminals using other DEC computers in distant service bureaus, preparatory to the installation of their own system.

Only it was not certain that their own system would arrive on schedule, which worried John. The problem, he told me, was not DEC's (see box) but his own firm's. They were considering delaying the installation until the whole system was up and running, proved through and through, not only in tests, but in actual use. In short, the system had to be proved *before* it would be bought.

And while the staff were used to computers that were delayed, they were simply not trained in the new concept of having to have everything on the air, and working, before they had their own computer to play with.

I think John may have been underestimating his staff a little. Yet, it is true that few DP staffs are currently set up or trained to produce the operational programs before obtaining the hardware.

In the past it has not been practical to even attempt to do so. But now, with remote operations, it is possible. And as a result, technology has dissolved one of the major holds the DP technicians and vendors have had over corporate management for as long as there have been computers.

John is just one of the first managers to have come to grips with the new situation, but he won't be the last. That is another 1974 technical revolution.

Previously, a successful proposal for a new DP system resulted in the delivery of the hardware, and then it was the duty of the programmer simply to get the expensive system into use as quickly as possible – even at the cost of changing the specifications, adding new features, etc.

The hardware had to come first before the programmer could be expected to produce – and once it was there, it was impractical to throw it out. So the actual programmer loyalty was to the hardware and software as actually delivered, rather than to management and the original specifications.

It had to be that way, from the nature of the beast, and the whole situation was summed up nicely in the phrase often used about important aspects of software, "This is something with which the programmer need not be concerned."

Now, however, the programmer is vitally concerned with anything, hardware or software, which stands in the way of the job being done as management expects it to be done. Because, if it isn't done that way – then management can decide to cut its losses, and toss both the system *and* the programmers out!

In fact, management, which never really abdicated control as many people have claimed, is beginning to reestablish itself in active control.

A Great Opportunity

This, of course, provides a great opportunity for the programming profession, because they have the capability of interfacing hardware, software and application in a way no others have. They can therefore seize the opportunity to demonstrate their increased responsibility under the new situation, transfer their loyalty from the software and hardware that management has been persuaded to procure, (and which the programmer is forced to use willy-nilly), and instead, assert their expertise in providing actual usable estimates of system capability, learning curves of system improvement, etc.

And sticking to them.

Truly, remote processing now allows the greatness of computers to be captured by the really responsible people – the local programmers, even though their training was in an era when they could only work with what was provided, (as often as not faulty), and could not take responsibility.

It is a great opportunity, and I hope they grab it.

Thank You, DEC

The president was shocked.

"You are just going to give me the computer and the standard software – your Cobol, Fortran etc.?" he asked. "You are not going to promise to supply all the support that will be needed to solve my problems?"

"That's right," responded the computer salesman. "We will give you the tools, but we will not guarantee results."

Then he went out of the president's office. With an order.

He got the order for a Digital Equipment computer because the president already knew that, in fact, the computer vendor could not guarantee success. He had found that out the hard way over the previous years.

Thank you, DEC, for honest selling.

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Letters to the Editor

DP Schools Offer Education Impossible for Universities

The article by Joseph T. Rigo about private DP schools [CW, May 8] made some very bold statements. I agree with his comments concerning the deficiency that exists in the standards by which we judge these schools, but that is all.

The data processing fundamentals, programming principles computer operations and systems training I received at the DP school I attended have been invaluable to me. This school's instruction and guidance were very professional.

Yes, there is a need for "distinguished computer professionals" at some of these schools. However, I feel Rigo's article is an insult to sincere DP school educators and any student who has attended a DP school.

These schools do have an "honest role in our great scheme." These schools can offer the industry and their students advantages a university cannot.

I know; I have been both places.

James R. Davis
Richmond, Va.

There's Very Little Humor In Educator's Position

Regarding the "DP School" cartoon [CW, April 24]:

It is unfunny, very sad and more than a trifle prejudicial to imply that those who teach data processing (and/or operate DP schools) do so because they are unfit for any other position in the field.

Perhaps it is the result of ineffectual public relations, or somebody's "bad experience" that we in this career have such unsavory reputations.

However, please let it be known that the majority of us are competent, hardworking, diligent, dedicated and caring.

Please do not jeopardize our already tenuous position in the data processing field by such "humor," regardless of how funny it may seem at first glance.

A.E. Lawson
Data Processing Instructor
Group Hospitalization, Inc.
Washington, D.C.

He 'Shudders' at Reference To Role of DP Operators

Re the article "At Last . . . A Few Good Words on Private DP Schools" by J.T. Rigo in the May 8 issue.

I take exception to the apparent slur of computer operators ("some of their graduates actually have to settle for taking jobs as [shudder] computer operators").

May I remind, no, may I inform Rigo, we *are* data processing, we make it happen and no operation can operate effectively without us.

All the equipment in this paper may be directed at managers, but we operate it and "nurse" it when it's "sick."

So, Rigo, I believe we are more important then a "shudder." Take time to look at our job, you might learn something.

Walter C. Adams
Console Operator
Phillips Van Heusen Corp.
Piscataway, N.J.

RPG Programmers Slighted

Regarding the article on "DP School Inadequacy" [CW, April 17]:

The subject of fraudulent data processing schools in our country is a worthy one. However, I wish to take exception to a small part of the article.

I totally resent the reference to "RPG-type programmers" as being the only type programmer these schools can turn out. As if a programmer using the RPG language was somehow inferior.

Homer Cates spoke of these DP schools as being "degrading to those of us in the profession." This is true. But it is also unfortunate choices of words such as his that cast degradation upon us.

R.M. Goodwin
Senior Programmer
Teledyne Aqua Tec
Fort Collins, Colo.

Please Spare the Fantasies

Concerning the flight into fantasy of Miles Benson and his story of poor Paul S. [CW, May 8], please spare us such infantile drivel in the future.

If the management of American Steel and Foundry was stupid enough to place a man in a position of significant responsibility who openly criticizes his equals to his superiors, who abandons professional ethics for self gain, and who delays all decisions for as long as he can, they won't be in business long.

Barry M. Walden
Manager, Systems Development
Department of Centralized DP
State of New Hampshire
Concord, N.H.

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Faster Than Conventional Tests

Wellsco Builds Synthetic Benchmarks From SMF Data

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – Five simple programs and two sorts have given Wellsco Data Corp. the ability to create and modify synthetic benchmark jobstreams from OS/360-370 SMF type 4 records, and these jobstreams are cheaper and easier to use than conventional benchmarks, according to Wellsco senior software programmer Carl King.

Writing in the April issue of *EDP Performance Review,* King noted that the synthetic approach is responsive to a changing workload and "greatly increases the amount of useful work" that can be accomplished by a benchmark.

The procedure he described solves most of the usual problems relative to benchmarks by replacing the task of selecting representative jobs with the task of selecting a representative time period. Since this time period would normally be the peak load situation, it is relatively easy to identify from the SMF records.

The programs used to create the jobstream start with an extract run that picks selected fields – from JOBID and attach time, through end time, step number, core requested, CPU time and the like – from the SMF type 4 entries. A sort then puts this captured data in JOBID and step number sequence to group all steps of the same job together.

Another program calculates the sum of end time minus attach time of the steps, the number of jobs and number of steps run. A new file is then created and sorted into attach time sequence, thus putting it into chronological order.

The third and fourth programs work together to finally create the jobstream, control cards specifying device types and volume serial numbers and the JCL to allocate and catalog the data sets required by the jobstream.

The fifth program is the program specified in the synthetic JCL produced by program three. The execution of this program, subject to various parameters the user can specify, is the basis for the synthetic benchmark and each individual job step.

The program retrieves EXCP counts and CPU time from the parameters, and the number and type of data sets from the TIOT. It inspects SYSIN to determine factors to be applied to the EXCPs and the CPU times, builds and uses DCBS for each data set, and divides CPU time by EXCPs and loops, executing an appropriate number of instructions for each EXCP until a counter drops to zero.

Varied Environments Studied

The procedure was used on Wellsco's 370/155 using 3330 disks and the jobstream itself consisted of six jobs, with a total of 18 steps. The procedure was duplicated three times, in part to test repeatability of a given step – from SMF's point of view – at different points and, therefore, different environments within the jobstream.

Wellsco used the modification potential of its jobstream creation routines to make 14 separate runs, testing a variety of situations, including changes of initiators, use of ASP, use of virtual storage.

King noted that the synthetic benchmarking is particularly useful in that it allows the user to push resources to their limits. Once an analyst knows the maximum potential, he can get hard answers to questions about what percentage of capacity the current uses or projected workloads impose on the system.

This in turn could point to the need to expand the use of specific peripherals, for example, rather than replace a mainframe.

Copies of the April *EDP Performance Review* are available at $5 apiece from Applied Computer Research, 8808 N. Central Ave., Phoenix, Ariz. 85020. The monthly is available for an annual subscription of $36.

RTL/2 Versions Back 360/370, DEC PDP-11 And ICL System 4

LONDON – Users with IBM 360/370, DEC PDP-11 or ICL System 4 computers can develop and run on-line data collection, communications and control systems, based on reentrant coding generated by the Real-time Language/Two (RTL/2) software now available in the UK and Western Europe from SPL International.

All code produced by RTL/2 is reentrant to handle multiple task programs under which activities proceed in parallel. Individual tasks may have identifiable private data bases and these, together with high-level supervisor calls, are said to provide efficient task control and interaction.

The language structure enables "stringent" checks to be applied during compiling and linking of programs, and further checking to take place at run time. Such checking, and a complementary error recovery system, is essential for real-time environments, SPL said.

Under RTL/2, variables and data structures are geared to the on-line real-time environment also. Supported data forms include bytes, fraction variables and record structures. Reference or "pointer" variables enable further structures – such as lists and queues – to be developed as the user's needs change.

All RTL/2 software is built up of units called "bricks," of which there are three basic types. A procedure brick is a set of RTL/2 statements defining the logic to be applied in a specific situation. RTL/2's algorithmic facilities "compare favorably" with Fortran or Algol.

"Stack bricks" provide temporary work areas for each individual task and "data bricks," or named common data bases, are used to store data of interest to several tasks.

RTL/2 can be used on an OS-based IBM 360/370 or under the J operating system on an ICL System 4. The "size" of the language "makes it feasible to compile on a typical 16K computer," the spokesman said. The DEC PDP-11 implementation is nearing completion, he added.

SPL International is at 12-14 Windmill St., London W1.

Data General and User's Group Formalize Software Support

SOUTHBORO, Mass. – Users of Data General minicomputers have two new services to help them keep up with fixes and enhancements to operating systems or language processors.

The Software Subscription Service (SSS) provides for the automatic distribution of all updates of whatever operating system or language processor the user needs. Yet SSS is provided by system or language, so a user isn't overwhelmed with material that isn't wanted, Data General noted.

The Summary of Available Software (SAS) is a publication, to be issued approximately every three months, listing all the updates of all Data General supported systems and languages. From this, the user can order those updates or new systems that seem appropriate, and pay only for what is requested.

While the company is formalizing its distribution of basic software, the Data General User's Group is releasing a new catalog of application programs that it has available for the cost of reproduction. The current listing includes almost 70 programs, and a group spokesman noted that another 15 to 20 programs are almost ready for distribution.

The user's group is also in the process of organizing regional meetings so that users can share experiences and techniques even though they might be inappropriate for the library listing itself.

The company's SSS is available for a yearly fee of about $300 per operating system or language, but the subscription fee is reduced for those users who use several systems or languages. Once the total subscription fees reach $1000/yr, a spokesman noted, the fee for additional systems would be cut to $75.

Before the start of SSS the company distributed its software to users who asked for it and charged them the $40 to $50 it costs to reproduce the coding from the master tape. This procedure will continue for nonsubscribers.

Copies of the SAS are available from the company; copies of the application program library listing are available from the user's group executive secretary at company headquarters, Route 9, 01772.

'RTX' Dresses Up Naked Mini

IRVINE, Calif. – Installations with Computer Automation Alpha or Naked Mini minicomputers can now use the company's Real Time Executive (RTX) to build the operating systems they need to support their applications. RTX is modular and routines can be added or omitted without altering the basic system.

Heart of the RTX system is the nucleus coding, a multitasking executive that provides the application programs with task control, priority scheduling, interrupt service and communication between RTX tasks. The nucleus requires only 650 words of memory, the company noted.

The Input/Output Executive (IOX) subsystem can be added to the nucleus to provide the user with a modular method of I/O device management and support. Application programming is simplified, since I/O protocol is preestablished and well-defined; the user can develop any kind of device handler and operate it under IOX control, a spokesman explained.

The Communications Executive (Comx), another RTX subsystem, supports both synchronous and asynchronous communications. Since the actual communication device handler is operated under control of IOX, the user may apply several types of protocols to one type of device without duplicating device handlers.

To aid the user during program development, or later, as problems appear, the RTX library also includes a real-time debug program. With this, the user can examine and alter his program while it is being executed in a real-time environment.

RTX is available for $500 from Computer Automation at 18651 Von Karman.

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VIEWPOINT

Combining Analysis, Programming Work May Ease Staff Tensions, Help Users

By Frances Smyth

Special to Computerworld

In the stratified, status-conscious environment of large business firms, job descriptions are the ultimate expression of one's work and worth. A codified structure is an obvious necessity in a large organization, but it has the equally obvious drawback of rigidity when faced with dynamic and new requirements. Such a set of requirements is inherent in the formation and continuation of a DP installation.

Computers and the personnel who work with them show no signs of the comfortable staidness found in the classic organization departments – in fact, computerization even threatens the established structure and its dogma. A resulting uneasiness in personnel departments is a symptom of a major problem facing management in the nurturing and controlling of data processing.

For we haven't even come close to determining what kinds of people we need in data processing and what exactly they should be doing. Even a relatively small, relatively new DP installation has likely undergone a fair number of reorganizations, often initiated by those inevitable parasites, the management consultants. The unrest demonstrated by this is really indicative of an upper management "gut feeling" that productivity is not what it should be. Improper utilization of personnel is often viewed as a prime reason for this problem.

Therefore, a good deal of paper is created, distributed, read and often ignored about job descriptions and manpower loading.

Attempting to better mesh people with tasks to be done has become a time-consuming frustrating task with many partial successes reported which don't endure long after they are reported. In the last nine years, I've viewed the following schemes with some wry amusement and, finally, some hope.

Classical DP shops (if one can ever use *that* adjective in as new a field as ours) were organized on a separate and not very equal basis with programmers in one area and systems analysts in another. Each area had its highly stratified organization with carefully preserved privileges by rank. The highest level programmer had exactly one career path to follow; it led directly to systems analyst trainee. Should the programmer want to "remain technical," he was viewed with some scorn and often was forced to change companies to obtain recognition and pay increases.

Systems analysts, unless they came from the programming area and were therefore on the lowest level in the group, rarely knew or wished to know code. They viewed programming as a semi-clerical task and their specifications often revealed the depths of their ignorance. As a result, this type of organization was generally characterized by internal strife and poor quality products.

In the resultant shakedown, new approaches were suggested. One of these was the mixed discipline team, organized by project area and generally reflecting the same systems analyst over programmer hierarchy.

Evolution in Process

Still, the breakdown of the different discipline hostility was beneficial and some productivity gains were noticed. A number of installations are still organized in this manner but an evolutionary process has begun that seems far more promising.

This evolutionary process is the combining of the programming and systems analysis functions into one job. Call him the job programmer analyst, information analyst, information designer – it doesn't matter. What we now have is someone who can communicate with user departments on needs and then respond personally and productively. And we have such an entity because of several current trends in data processing.

First is the growth of interactive computing with its flexibility of turnaround time and a new array of languages and facilities. An interactive mode gives the analyst great freedom in planning work schedules and producing timely responses to "emergency" requests.

The interactive facility is useful in certain applications where input exists, as a range of values rather than a specific quantity or a probabilistic relationship should be utilized.

A second trend has been the proliferation of special-purpose languages and generalized software. Now that the big part of the make-or-buy question has been successful for so many installations, the not-invented-here problem may finally be on its way to a much deserved oblivion.

Frances Smyth is a senior systems programmer for Metropolitan Life Insurance Co., and an adjunct assistant professor of management at New York University.

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AT&T Troubleshooters

Datec Teams Specialize in Solving Network Problems

By Ronald A. Frank
Of the CW Staff

NEW YORK – Late last week several Bell System engineers ran a special test message across the country in an attempt to solve a transmission problem for a large private line data user. To test the circuit, AT&T and local Bell technical operating specialists had to observe transmission characteristics at key test boards along the network.

Although this specific test was on a simulated problem, tests just like it are happening on a regular basis in many parts of the telephone network. Coordinating such troubleshooting operations is an AT&T group called Data Technical Support or Datec.

Datec specialists, known as teams, are usually called in by local operating companies after a user's repairman and his superiors in the local operating company have been unable to solve a technical difficulty.

As can be expected, the Datec teams are experts in all phases of the telephone network including both Bell and independent phone companies. But in addition, they often have detailed knowledge about the operation of a remote batch terminal, noncarrier data set or other communications device operating on the user's network.

Most users who have had direct experience with Datec assistance agree that these troubleshooters include the best technical firepower that AT&T has. And most praise the Datec specialists for solving their problems in short order.

Two Modems 'Incompatible'

"We had two modems, both Bell Western Electric 201A models on a switched network data link," one large New England user said. "The 201A would not work with a similar Bell unit but it operated fine with an equivalent customer-supplied data set. When the 201A in the other part of the country dialed into the 201A here, it wouldn't work. But when we substituted the nonBell modem, the link worked fine," he said.

Needless to say, the incident was embarrassing to the local Bell specialists. Datec people came out to look at it on a Saturday, and by the end of the following week they had another 201A that worked, the user explained.

The "absolute details" on what happened were not revealed to the user and this brings up a common complaint of those users who have been aided by the Datec teams. "They should find a way to update our local support representatives on exactly what they have done to correct a problem," one user suggested. Often the Datec teams find a solution but fail to relay the pertinent data to either the customer or the local telephone craftsmen.

To this day, the user is not sure why the replacement 201A worked when the previous unit did not. He suspects that the new data set "was brought up to Bell internal specifications" but he cannot be sure.

Another problem related to a 9,600 bit/sec line with customer-provided equipment. "We had carrier system problems and Datec made certain recommendations about modifying the line facilities to the local Bell operating company. After that the nonBell data sets worked fine," the user said.

When the data sets were not working, the user had a four-wire facility on 3002-type lines with C-2 conditioning. All the Datec people would say is that they changed the facilities. The user believes "they took me off carrier and put me on wire" but he is not sure.

One case in which Datec assistance helped occurred recently when a General Electric site at Jonesboro, Ark. was unable to keep the printer on its remote batch terminal operating. "The line was being disconnected many times per day," explained Herb Allen, specialist for data systems operations at GE.

At 2,000 bit/sec operation over the firm's CCSA network, the normal procedure before Datec would have been to report the problem to the nearest switching center in Dallas. Various local people would then be dispatched to try to solve the problem.

But when the terminal began having printer outages, GE contacted Datec from its Schenectady data center. The Datec specialists worked with local Bell craftsmen at the Dallas center and at Fort Wayne, Ind., the other end of the link on which the terminal was operating with a CPU.

Arrangements were made for a special test by Datec. "They arranged to have the right people, in the right place, at the right time and determined that the disconnect was coming from the Fort Wayne CPU. They further determined it was either the data set or the CPU and not the PBX at that end," Allen said.

He emphasized that GE is considered a national account by AT&T and therefore has considerably more flexibility than smaller users in seeking Datec help.

Of the five users contacted for their opinions on the Bell service, most agreed that Datec is very efficient for the large user with a nationwide network. But Datec assistance for a smaller data customer would probably be more difficult.

In such cases it was suggested that the user request Datec help through his local salesman, data consultant or other local telephone contact.

Significantly, each user said the Datec specialist in his geographic area was the best in the country. Only in one case did a user feel the technical expertise should have been better.

Data Briefs

On-Line Software Monitor Handles HIS 200/2000 Nets

LOS ANGELES – Commline, Inc. has a roll-in/roll-out TP monitor which allows Honeywell 200/2000 users to operate online simultaneously with Mod 1 MSR batch programs in the background.

No existing programs or files have to be modified, according to the company, and the communications programs can be written in "any standard Honeywell language."

A second version of the monitor will allow on-line communications to operate in a partition of OS/2000 in parallel with other job streams. This can also be done without modification of existing programs or files, the company said.

A fully paid-up license for Mod 1, MSR or OS/2000 users costs $15,000. An annual fee of $500 includes maintenance and system enhancements, from 700 Wilshire Blvd., Suite 410, 90017.

Gandalf Has Short Haul Modem

OTTAWA, Ont. – Gandalf Data Communications Ltd. has introduced its 200D series of hardwired digital data sets.

The series can operate at speeds up to 9,600 bit/sec over two-wire or four-wire lines and are said to meet Bell System specs for metallic circuits.

The 200D data sets can transmit data "up to eight miles on 26 guage cable," according to a company spokesman. The data set is designed to operate over short distances and in many cases can replace local common carrier facilities, at a savings to the user, he added.

The 200D costs $560 and is available in the U.S. from Penril Data Communications Inc. 5520 Randolph Rd., Rockville, Md. 20852.

Modular Microcontroller System Serves As Front End For Minis

LOS ANGELES – Advanced Terminal Systems, Inc. has introduced the MC-1600 communications-oriented programmable controller designed to operate as a stand-alone controller or front-end processor to a minicomputer or larger mainframe.

The heart of the modular system will be the high-speed/microcontroller that costs between $650 and $3,000 depending on configuration. The microinstruction cycle time of the MC-1600 is "under 200 nsec and typical program instructions can be handled at the rate of one million instructions per second," the firm claimed.

A variety of compatible modules was introduced with the MC-1600 as part of the system. These include a Bell 103-compatible data set designated the DM-2103F, G that includes a diagnostic display of interface signals, a built-in function test capability and compatibility with Bell DAAs. The data set costs $375.

A Bell-compatible auto dialer module is designated the AD-1201 and costs $150. The TTD-1000, a Touch-Tone generator module is priced at $50; a receiver/decoder module is priced at $250; and a programmable telephone tone test set, the TTU-1100, costs $3,950. Most of the modules except the test sets are designed to fit into the microcontroller as part of the complete system.

A complete system to multiplex 12 lines would costs about $2,000 for everything except the I/O cards. The front end is compatible with the DEC PDP-8 and PDP-11, and the Data General Nova.

Advaned Terminal Systems can be reached through Box 90121, 90009.

HP Terminal Plotter Runs on 2000 Series

PALO ALTO, Calif. – Hewlett-Packard has a high-speed X-Y plotter that can plot up to seven vector/sec in any direction. It interfaces with TTYs and most 110- or 300 bit/sec terminals.

Binary data is accepted in Ascii format and is switchable between 10- or 30 char./sec. Designated the Model 7203A, it operates in parallel with a terminal and plots graphs on any size paper up to 11 in. by 17 in. Software is available only for the HP 2000C and 2000F CPUs.

Smoothly Done

Vectors of any length are plotted in any direction and the resulting graph appears as a smooth line, in contrast with the staircase drawn by incremental plotters, HP noted. If there is an error in data transmission, the point is omitted, and the next correct point is plotted so that the data is not lost as with purely incremental plotters, HP added.

The 7203A plots about four times faster than the earlier HP plotters, but costs the same at $3,830. The company is at 1501 Page Mill Road, 94304.

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Replace's Bank's On-Line System

NCR 270 Guides Inexperienced Tellers

HOLYOKE, Mass. – Community Savings Bank here has replaced its on-line teller machines with NCR 270 Financial Teller Terminals, which reportedly can lead inexperienced tellers through each step of any transaction. Simultaneously, the machines update account files stored on a remote computer. The installation is described by NCR as the first in the country.

A function display keyboard that guides a teller through the transaction sequence and a message display panel that reports system, teller and account status eliminate most training problems and facilitate customer service. Thus, new tellers can process complicated transactions without delay. For the experienced teller, processing is faster and account information is more readily accessible, NCR said.

The NCR 270 financial terminal is an on-line, point-of-entry device which permits tellers to transmit and receive information directly from a central processing facility. The terminal could also be described as a programmable minicomputer that processes all financial transactions.

Circuitry for a wide range of applications is integrated in the NCR 270 terminal; memory for terminal control and programmable memory are both included. Transaction programming and options on hardware features meet all of the common requirements for domestic and international teller operations.

Buffers in the terminal facilitate continuous printing and enable a single input transmission for all common transactions. The terminal has:

- A 56-character input storage buffer; this buffer is programmable up to 144 characters.
- An 84-character input/output buffer; this buffer is programmable up to 219 characters.
- A 30-character data control buffer.

All control functions of the terminal, including communications logic, are incorporated in the unit; it does not require a separate control unit. This provides a significant savings in space over the NCR 42 on-line machines that Community used previously, a spokesman noted.

The 42 requires a window-machine controller, a branch controller and an external data set. This gear is unitized in the 270. As its communications interface and control are both self-contained, the only external cabling is an AC power cord and the communications lines.

The NCR 270s at Community Bank are linked with a central computer system at The Western Massachusetts Computer Center where complete and up-to-date customer records are on file.

Since the NCR 270 terminal contains all of the controls and arithmetic capability for data input, processing and output, the terminal can process transactions off-line without assistance from the central computer.

When the 270 is unable to communicate with the computer because of a malfunction or disabled communication lines, the terminal can continue to service customers.

Since the audit journal of the terminal maintains a complete description of all transactions, the supervisor can manually re-enter the off-line transactions from the journal when communication is reestablished. The computer then updates customer records with this data.

Most important in on-line installations, the 270 terminals hold the solution to communications interruptions, the spokesman noted. They can be adapted to accept magnetic tape cassettes so that when a line is down, transactions can be captured and automatically transmitted when communications are resumed.

Ten different types of inquiries are permitted on the savings master file and teller totals. Descriptive holds may be placed on accounts to inform the teller of special procedures when customers are present.

The "pure transaction" file contains all the information necessary for reporting the transactions that have occurred each day.

This file also contains dollar transactions; that is, utility bills, cashier's checks, money orders and so on.

Thirty-four terminals have been installed in an on-going program to update equipment in the bank's 12 branches.

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- How to upgrade to a bigger system.

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As a participant in the Data Communications Seminar, you'll receive a valuable set of reference materials prepared by the ICC Institute. These materials include a comprehensive 2-volume looseleaf outline of all course materials, a copy of "Data Modem Selection and Evaluation Guide" by Vess V. Vilips, a "Data Communications and Teleprocessing Dictionary" and a line-cost calculator.

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Dr. Dixon Doll leads the expert faculty at this seminar. He has his Ph.D. in Systems Engineering from the University of Michigan and many years of experience in this field as a consultant and educator. He has performed work-study with communications techniques at M.I.T., taught graduate-level computer systems design, and has served as professional consultant to such firms as IBM, Raytheon, ICC and MCI. Dr. Doll is in charge of our faculty of experts, and takes an active part in the entire seminar.

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Bits & Pieces

AMS Add-On Memory Brings IBM 370/135 to 384K Bytes

SUNNYVALE, Calif. – Advanced Memory Systems, Inc. (AMS) has installed 240K bytes of main memory on an IBM 370/135 in Atlanta. This brought the total memory of the system to 384K which AMS claims to be the largest installed main memory on a 370/135. AMS is at 1276 Hammerwood Ave., 94086.

2.5M-Byte Fixed Disk Enhances Sycor 340 Intelligent Terminal

ANN ARBOR, Mich. – Sycor continues to convert its 340 intelligent terminal to a mini-type system with the addition of a 2.5M-byte fixed disk.

The disk offers two disk platters of 203 track/surface and has an average access time of 80 msec.

Sycor is located at 100 Phoenix Drive, 48104.

Fixed-Head Disks For Minis Offer Up to 153M-Bit Capacity

SAN DIEGO, Calif. – Two series of fixed-head disks for DEC PDP-11 and Data General Nova minicomputers offer storage capacity of 6.7- to 153M bits and 8.5- or 17 msec average access time at a cost as low as 1/25 cent/bit.

The only real difference between the A7310 and 9110 disk systems, according to Digital Development Corp., is the rotation speed of the disk. The A7310 spins at 3,600 rev/min to give 8.5 msec access time with 100K bit/track. Memory size ranges from 250K words to 6M words.

On the 9110 series, the disk spins at 1,800 rev/min to give 17 msec access time with 150K bit/track. Memory options range from 500K words to 8M words. A 2M word capacity drive in either series is priced at $22,200 for Data General minis and $24,700 for the DEC PDP-11s. The firm is at 5575 Kearny Villa Road, 92123.

IBM 1800 Not Dead Yet

FLINT, Mich. – Users of IBM 1800 computers can use Process Computer Systems, Inc.'s Series 2000 general-purpose interface to link 1800s to automated industrial processes for production monitoring and control, product testing, quality monitoring and other peripheral-based applications.

The company said users need only specify available and required analog and digital signals and existing monitoring and control requirements. The company will fit the interface with appropriate modules for control, channel address decoding, analog and digital process interfacing and computer I/O interfacing.

Prices start at $1,240 from the firm at 5467 Hill 23 Drive, 48507.

Recycled H6023s Come Fully Equipped

WALTHAM, Mass. – About 20 users can still obtain Honeywell 6023 computer systems as the firm continues to recycle systems replaced at World Wide Military Command and Control System (WWMCCS) sites with processors with extended instruction sets.

The 6023 is roughly the equivalent of the 6030 system but is being sold at 40% under the 6030 price.

Honeywell revamped the WWMCCs units by adding peripherals and bundled software in four areas: banking, manufacturing, engineering/scientific and time-sharing.

The systems are offered either on a six-year lease or purchase basis. Monthly lease rates range from $14,700 to $29,900; purchase prices are from $609,000 to $1.1 million.

Tag Tabulator

Retailers can use the Monarch 2310 to read coded merchandise tags automatically and store the information on tape, thereby eliminating the keying of inventory and sales data on transactions. The unit reads up to 800 tag/min and leases for $780/mo using an 800 bit/in. tape drive. Monarch Marking Systems, Inc. can be reached through P.O. Box 609, Dayton, Ohio 45401.

Considering Multivendor System? Wise User Weighs Pros, Cons

By Perry Scott
Special to Computerworld

There are many problems and many advantages for users who elect to put together a mixed-vendor computer system, but the wise user looks before he leaps.

A multivendor system is generally less expensive than a system procured wholly from a mainframe vendor because most mainframe vendors do not produce all (or any) of the peripherals necessary for a total, productive system of even the simplest configuration. Therefore, the cost to the user selecting the equipment is higher because the peripherals have gone through a mark-up in price which could be eliminated by the user purchasing peripherals directly from the individual vendors.

In addition, the peripherals available from indepdents may often be superior products to those offered by the mainframe vendor. The vendor's reason for selecting and offering a given peripheral with its systems is not always quality, as OEM price is of major concern.

Only through use of a multivendor configuration can some systems be tailored to the needs and requirements of the user. Upgrading, a major concern to many users, can often be accomplished more economically and rapidly in a multivendor environment than with a system from a mainframe vendor.

The problems of a multivendor environment sometimes, however, outweight its advantages. The usual list of problems includes:

- Maintenance responsibility is sometimes difficult to delineate. Frustrating circumstances have arisen from service engineers claiming the hardware problem is in the "other" piece of connecting hardware.
- Vendors do not always provide their products with compatible connectors and wiring, thus causing problems during installation and sometimes continuing malfunctions.
- Software provided by some vendors is "keyed" to the response times (and often inherent logic timing) of their peripheral controllers in an effort to require their users to purchase the peripheral controller. All peripherals of a given class may not use the identical data I/O instructions, so the handlers may not be compatible. Entities purchasing hardware for resale, especially if only peripherals, must be wary of equipment which requires considerable "patching" to existing vendor software.

There are solutions to these and other problems. If a multivendor minicomputer system is chosen as the ideal for a given situation, then the user should demand certain criteria be met and that all interested parties be aware of the circumstances. Following are some suggestions which may be helpful in determining the criteria and easing any implementation problems:

The most important suggestion is that the buyer get qualified, technical help. Under no circumstances should someone without electronic knowledge readily

(Continued on Page 26)

7 HP Systems Based on 2100S

By Vic Farmer
Of the CW Staff

PALO ALTO, Calif. – Hewlett-Packard has packaged seven configurations based on its microprogrammable HP 2100s minicomputer for scientific users. These systems make it easier for the user to upgrade, HP claimed, and two configurations (S/250, S/440) can save the user up to $10,000 over normal prices, the firm said.

The Scientific/250 combines scientific computation capability with data-base management software. It incorporates HP's Image 2000 data base management system with fast Fortran firmware instructions.

The S/250 configuration consists of 48K bytes of core, 4.9M byte cartridge disk, 200 line/min printer, 1,600 bit/in. 9-track tape, 500 char./sec paper tape reader and a CRT. Priced at $59,950 the S/250 can be expanded to provide access to 32 concurrent users.

The Scientific/440 is the largest in the series devoted to time-sharing and in its basic configuration has two 16-port multiplexers, two 2100S minis – one with 32K byes for main processing and one with 8K that serves as a front end – two 4.9M-byte disks, a 1,600 bit/in. tape, Fortran firmware, DOS and an ASR 35 teletypewriter. The S/440 is priced at $82,450 and uses time-shared Basic Level F.

The other systems are:

- S/110 – 2100S, 8K bytes of core, 500 char./sec paper tape reader and ASR 33 TTY for $15,750. The S/110 can be used either as a stand-alone system or as a satellite.
- S/210 – 2100S, 16K core, 500 char./sec reader, ASR 33 and 4.9M byte cartridge disk operating under DOS IIIB for $30,950.
- S/310 – same as S/210 but with multiprogramming, Real Time Executive Operating System for $36,050.
- S/410 – 2100S, 16K, ASR 35, 4.9M-byte disk and 16-port multiplexer operating under time-shared Basic Level E for $34,950.
- S/420 – Same as the S/440 but with one disk drive, one 16-port multiplexer and an 800 bit/in. tape for $67,950. The S/420 is also said to have better response time than the S/410.

The systems are available in 90 days from the firm at 1501 Page Mill Road, 94304.

Firmware Boosts HP 3000

PALO ALTO, Calif. – HP has developed an extended firmware floating point instruction set, the HP 30011A, which claims the company improves execution time on HP 3000 series computers by factors of seven to 15.

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Plagued by Paper Problem? Here's Help

NEW YORK – Having difficulty with your paper supplier? Sy Kramer, president of Revere Business Graphics, Inc. has 10 golden rules:

- **Anticipate your forms needs.** Keep a closer watch than ever on the inventory of each of your forms. Plan ahead. Allow six to eight weeks for delivery, instead of the usual four to five. Deliveries will take longer and may be delayed because a particular type of paper is not readily available. You will also avoid costly emergency printing and delivery charges.
- **Be flexible.** Many paper grades, weights and colors already have been discontinued. Be prepared to accept alternates.
- **Colored ink** can effectively be used as a substitute for colored paper.
- **Reevaluate before ordering.** Review each form that comes up for reorder. Question whether you can do without one or more parts. Bear this in mind: Eliminate just 1 part from an order for 10,000 multiple-part computer or snapout forms and you save the cost of shipping, storing, processing, decollating, filing or distributing 10,000 pieces of paper . . . in addition to the cost of the paper and carbon itself.
- **Order larger quantities.** Instead of the usually recommended 12 months supply, order an 18 months supply instead whenever practical. This will assure a good supply, will be be a hedge against rising paper costs and will also mean lower costs per unit.
- **Consider reporting by exception.** Most reports convey operating situations and conditions which fall into three broad categories: Normal, above normal and below normal. Consider instituting the technique of reporting only deviations from the norm. It can potentially eliminate from 30% to 50% of costly report documents.
- **Use self-mailers** where possible as a means of saving on the use and cost of envelopes.
- **Carbonless paper.** As supplies of forms paper and carbon become tighter, consider the variety of carbonless papers on the market. They are more readily available than regular paper and beginning to come closer in cost.
- **Update mailing lists** to eliminate the waste of mailing pieces and envelopes.
- **Standard envelopes.** Wherever possible, design forms and mailing pieces so they will fit into standard size envelopes. They are less expensive and require less delivery time than custom sizes.

The Wise User Thinks First

(Continued from Page 23)

available attempt to "purchase the parts and plug it up." It is inevitable that the result will be nonmatched connectors and/or slightly different software.

In many cases, this assistance is available in-house, but the services of a qualified systems consultant could be a worthwhile investment. In general, they are familiar with the attachment of nonstandard items, and their services easily outweigh the cost of a "bad" installation.

When selecting equipment the buyer should ask vendors for user references on the use of their hardware with the chosen processor. Information from these references will identify software incompatibility and might possibly provide a reliable source for selecting a vendor for the interface and cabling.

If available in the buyer's area, third-party maintenance should be considered. Third-party maintenance, if the service engineers are familiar with the chosen hardware, is a simple means of bypassing the "fault delineation" problem.

If the amount of money is sufficient, an in-house maintenance person is possible. Problems outside the realm of an in-house staff could be remedied on a "time and materials" basis.

But the greatest effort should be aimed at proper installation of the chosen and delivered system, as the system will undoubtedly perform more reliably during its lifetime if it is correctly installed and checked out initially.

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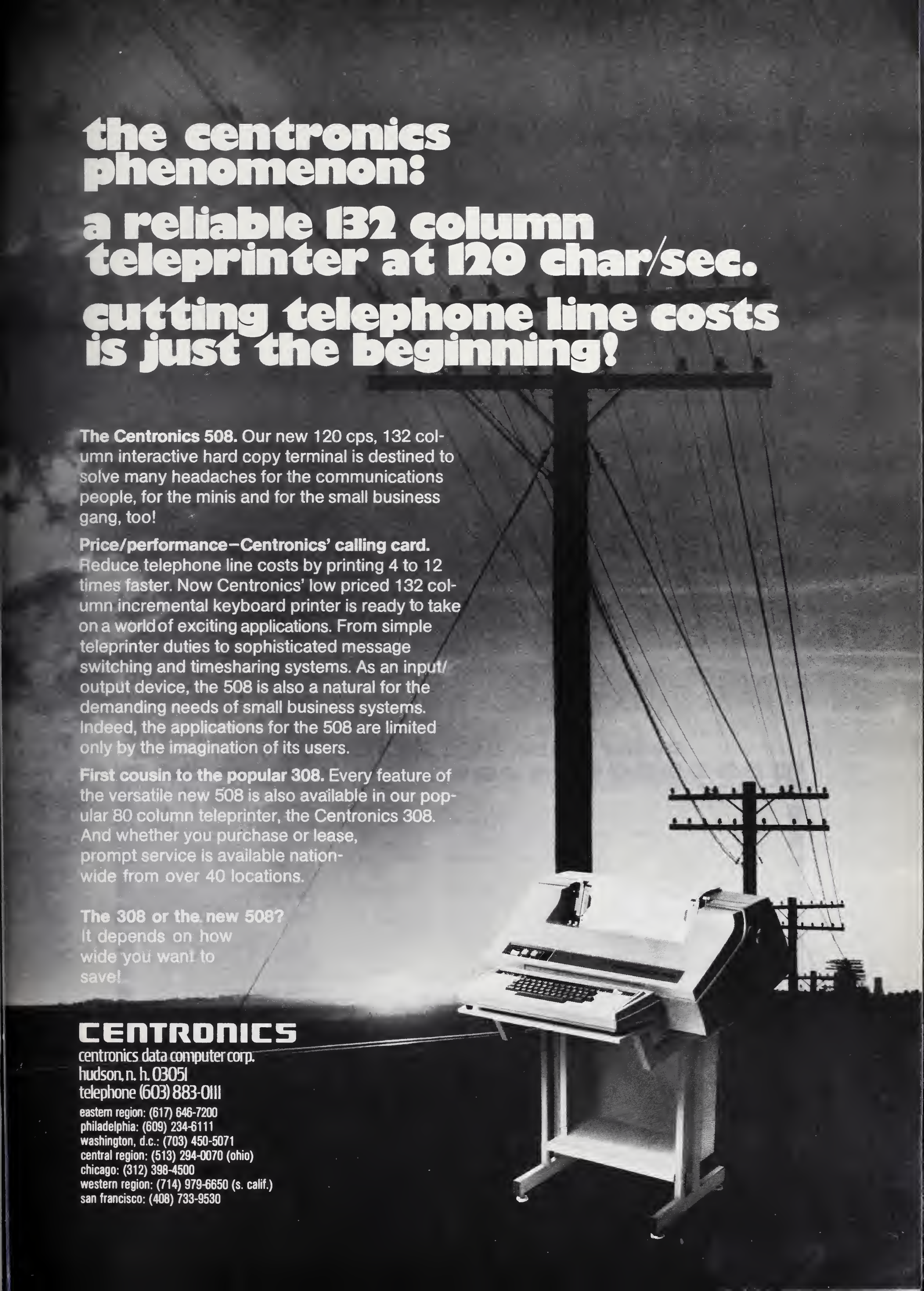

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Societies/ User Groups

Conference to Put 'Simulation in Perspective'

HOUSTON – "Simulation in Perspective" is the theme for the 1974 Summer Computer Simulation Conference, spanning the fields of chemistry, electrical engineering, aerospace engineering and management sciences, among others.

The technical program of the conference, July 9-11 at the Hyatt Regency here, encompasses over 40 sessions containing a total of 179 technical papers.

A special "Symposium on Energy," consisting of five sessions, will present energy problem solutions through simulation. Sample paper titles include: "Estimating and Predicting the Industrial Demand for Natural Gas: Canada, 1960-1980," "Assessment of Synthetic Fuels in the U.S.," "Japan Regional-Industrial Structure Matrix-Based Model (Jumbo)" and "Global Systems Analysis and Simulation of Energy, Resources and Environment."

Other sessions in the area of methods and languages will deal with simulation methodology, validation, dynamic modeling, hybrid systems and computer graphics.

Process and mechanical control, social sciences, biology, medicine and marine, nuclear and system engineering applications will also be investigated in papers ranging from "Color Video Graphics in an Interactive Environment" and "Simulation Data Base: Describing the World to the Computer" to "Simulation of the Time Response of Electronic Systems by Widespread Use of the Fast Fourier Transform" and "Dynamic Simulation of a Cattle Farm."

Registration fee is $55 before June 1, $70 after that date.

For further information contact M.E. McCoy, Martin Marietta Data Systems, MP-198, P.O. Box 5837, Orlando, Fla. 32805.

Selected NCC Sessions on Tape

MONTVALE, N.J. – The American Federation of Information Processing Societies (Afips) is making available cassette recordings of selected sessions from the 1974 National Computer Conference.

The tapes are $7.50 each, but orders for six or more tapes reduce the unit price to $7.

The recorded sessions are: #26 – The Effect of Changing Technology on Computer Graphic Systems; #27 – Current Trends in the Software Products Industry; #28 – Large-Scale Computer Network Experiences; #38 – Management Impact of Distributed Computing and Computer Networks; #43 – Computerized Transportation-Distribution – A User Overview (double session, two tapes – $15); #59 – Computer Networking – The User's Viewpoint; #73 – Security, Privacy and the Information Processing System; #96 – Charge-Out Systems for Management Acceptance and Control of the Computer Resource; #102 – Programming Debugging; #107 – Energy in an Evolving Society; #113 – Venture Capital for Computer Companies; and #116 – Panel on Digital Communications on Cable Systems.

The tapes are available from Afips Press at 210 Summit Ave., 07645.

Calendar

June 3-5, London – Minifest 74. Contact: Minifest 74, Polytechnic of Central London, 115 New Cavendish St., London W1M 8JS, England.

June 3-7, West Lafayette, Ind. – **Machine Processing of Remotely Sensed Data.** Contact: Carl Jenks, 116 Stewart Center, Purdue University, 49707.

June 4-6, Gaithersburg, Md. – **Symposium on the Simulation of Computer Systems**, sponsored by the National Bureau of Standards. Contact: Deanna Nelson, Department of Defense Computer Institute, Washington Navy Yard, Washington, D.C. 20390.

June 10-13, Newark, N.J. – **Computer Seminar.** Contact: Paul A. Burns, Director of Continuing Engineering Studies, Newark College of Engineering, 323 High St., 07102.

June 10-11, Montreal – **Telecomputer Applications Group Meeting**, sponsored by Shared Medical Systems Corp. Contact: William E. Bardwell, Shared Medical Systems, 650 Park Ave., King of Prussia, Pa. 19406.

June 11-13, Detroit – **Automotive Electronics Conference and Exposition.** Contact: Robert Rankin, 5544 E. La Palma Ave., Anaheim, Calif. 92807.

June 12-14, San Francisco – **Integrated Civil Engineering Systems Conference.** Contact: Ted Cook, Florida Power & Light Co., P.O. Box 3100, Miami, Fla. 33101.

June 17-18, Toronto – **Workshop on the Attainment of Reliable Software**, sponsored by ACM SigPlan and IEEE/CS. Contact: Harry Hayman, P.O. Box 639, Silver Spring, Md. 20901.

June 17-19, Denver – **Design Automation Workshop.** Contact: P.O. Pistilli, Bell Laboratories, 1200 W. 120th Ave., 80234.

June 19-21, Champaign, Ill. – **Fourth International Symposium on Fault Tolerant Computing**, sponsored by IEEE/CS. Contact: FTC4, Box 639, Silver Spring, Md. 20901.

June 20-21, Madison, Wis. – **Project Cost Evaluation Institute.** Contact: Ken Sparks, University of Wisconsin-Extension, Department of Engineering, 432 North Lake St., 53706.

CW Sponsors Seminar On Communications

NEWTON, Mass. – A two-day seminar intended to give attendees the basic information necessary for effective data communications planning, implementation and management is being sponsored in seven cities by *Computerworld.*

Some of the areas to be covered include basic terminology, terminal performance, line tariffs and cost-saving measures, line control software and multiplexing.

Dates and locations for "Data Communications – The Executive Imperative" are: Chicago, June 3-4; New York, June 10-11; San Francisco, June 17-18; Orlando, Fla., July 1-2; San Diego, Sept. 30-Oct. 1; Washington, D.C., Oct. 7-8; New York, Oct. 14-15; Chicago, Nov. 4-5; and Miami, Dec. 2-3. Total cost for the seminar is $350.

Further details are available from Walter Boyd, *Computerworld*, 797 Washington St., 02160.

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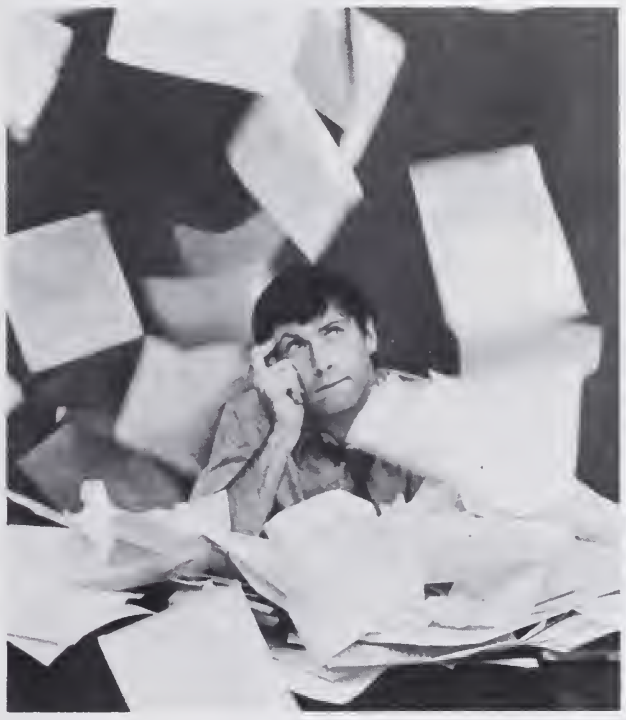

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System Helps 'Correct' Alabama Road Hazards

BAYOU LA BATRE, Ala. – State highway officials here are using a computer to determine the most effective means of correcting "death traps" on Alabama roads.

Designed by Dr. David Brown of Auburn University in cooperation with the State Highway Department, a computer program yields printouts which give highway engineers their three best alternatives for correcting a specific hazard.

The program, known as Correct, also estimates the cost of each approach, taking into account savings in terms of lives and property.

"In some cases we could improve a roadway hazard with work involving a $500 expenditure or a $1,000 expenditure without knowing definitely which was the better method. Now we can rely on something other than experience to help us make the right decision," commented highway director Ray Bass.

Center Managers Told

Student 'Ingenuity' Can Break Security

CHICAGO – Students are willing to devote a great deal of time and ingenuity to violating the security of DP systems, several panelists agreed at an NCC session on computing center management here.

In addition to the various necessary security measures, severe punishment, such as expulsion from the university, should be enforced for such violations, they said.

Roger Goodrich, assistant director of computer services at Brigham Young University, cautioned that security measures do carry a price tag, and the value of security must be determined in relation to its cost. Any system can be violated, he said.

Other panel members explained their experiences with distributive computing, which was defined in this session as centralizing the CPUs with remote I/O facilities, such as remote job entry and intelligent terminals.

Unfortunately, corporations have regarded distributive computing as a panacea, said Phillip C. Cross, director of information services at the Hill Center of Math Science.

Before switching to distributive computing, one should evaluate the feasibility of controlling computing from one site, he said.

About the only way a corporation can make effective use of such a system is to know what is involved beforehand, organize the staff, know the functions and get the right people in them, Cross said.

Charles V. Shaffer of the University of Florida noted the success of distributive processing might depend on the arrangement it supplants.

He said he finds it hard to defend distributed computing because of the inferior costs and user autonomy offered.

Shaffer advised possible converts to solve their management and financial problems before deciding on technical arrangements. "Don't try it if you're afraid of multiple vendors," he warned.

Cross listed some factors that appear to be advantageous for distributive computing, such as reduced rivalry and turnaround time.

However, these can be more apparent than real, he cautioned, because there will be scheduling difficulties to be resolved.

With the expected improved turnaround time, the center has less buffer time in which to make adjustments trying to keep the equipment running, he added.

Jack Worlton of Los Alamos Scientific Laboratories noted that growth in computing requirements is a failure of the scientific environment.

In 1962 the computer center at Los Alamos handled 6,000 job/mo; now the figure is approaching 50,000, he said.

Recently the center has begun to attach more significance to short-run jobs, as they contribute to those taking a long time to run, he noted.

The center's philosophy on software is "buy it when you can, modify it if you must, and do it yourself only when you have to," he said.

The center maintains a list of experts on specific program areas and has six consultants half time. This works better than three full-time people, he said, because they offer a broader variety of skills and enjoy the change of pace from their other jobs.

Cancer Victims Aided With Treatment Plan, Follow-Up Suggestions

DEKALB, Ga. – Using the computer as a diagnostic aid, many cancer treatment centers across the country are making headway in an uphill battle.

One such center in the thick of the fight is the Emory University Cancer Clinic here.

'Best Idea'

Although the computer itself does not pinpoint the location of tumors, Emory's chief radiation therapist Jim Fenn pointed out, it gives doctors here the "best idea" of what to do once the cancer is detected and located. The DEC PDP-8/E provides the staff with what he refers to as the vital "treatment-planning" program.

When a patient is referred to Fenn for treatment, he irradiates the area of tumor growth designated by the doctor. After the initial doses are completed, the computer system enters the treatment picture.

Because the program gives the computer's optical scanner the ability to evaluate "radiation appearance," as it shows up on an X-ray picture, a cross-section of the tumor is flashed on a screen attached to the computer, Fenn explained.

Treatment Evaluation

The system evaluates this pictorial data and then makes suggestions regarding further treatment, Fenn continued. For example, he said the system can determine if the radiation treatment had successfully reached all afflicted cells. If not, it may suggest that further doses of radiation are needed.

To aid the computer in its suggestions, Fenn said information about tumor size and depth and estimated radiation needed may be fed into the machine before it begins to evaluate the X-ray picture.

He noted that the service is offered on a time-sharing basis with several, smaller area hospitals that can't afford the system's $40,000 to $50,000 price tag.

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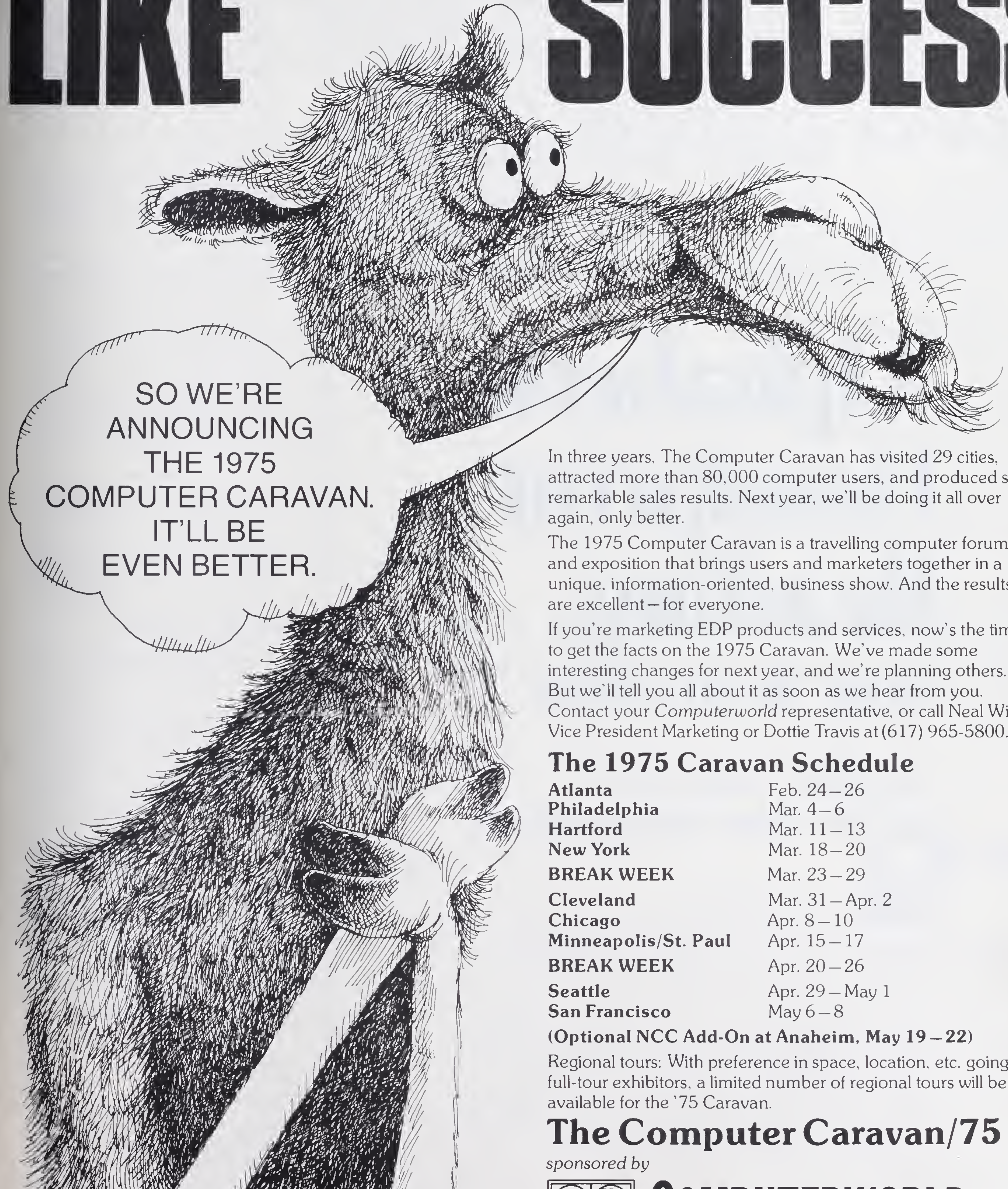
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If you're marketing EDP products and services, now's the time to get the facts on the 1975 Caravan. We've made some interesting changes for next year, and we're planning others. But we'll tell you all about it as soon as we hear from you. Contact your *Computerworld* representative, or call Neal Wilder, Vice President Marketing or Dottie Travis at (617) 965-5800.

The 1975 Caravan Schedule

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New York	Mar. 18—20
BREAK WEEK	Mar. 23—29
Cleveland	Mar. 31—Apr. 2
Chicago	Apr. 8—10
Minneapolis/St. Paul	Apr. 15—17
BREAK WEEK	Apr. 20—26
Seattle	Apr. 29—May 1
San Francisco	May 6—8

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Commercial, Private Systems Keep Media Moving

Magazine Allocations Precisely Balanced

ANN ARBOR, Mich. – In the publications distribution business, the magazines that are not read are almost as important as the ones that are.

In fact, it is four times as expensive to return unread or unused periodicals up the ladder – from newsstand to local distributor to national distributor to publisher – as it is to get them to the reader.

To help ease this situation, Computac, Inc., West Lebanon, N.H., has developed the Magac forecasting system for local publications distributors, which helps them reduce their number of returns and increase their sales.

Keeping a Balance

The distribution process is a complex one. The magazine publisher allocates to the national distributor and the national distributor to the local distributor, a given number of periodicals. The local distributor must then send to his dealers (newsstands) enough magazines to adequately supply its readers and yet not have an oversupply.

To do this, the local distributor must choose from hundreds of magazines, tabloids, newspapers and paperbacks and make the order for his dealers. Although the dealers may request additional or limited supplies of periodicals for a given period of time, the final allocation is determined by Computac.

But First . . .

Before this happens, however, terminal operators at Computac distributors from Maine to Miami key into a Sycor 340 intelligent communications terminal the name and issue date of magazines they wish to receive.

The data on the remote 340s is then polled by a master station 340 at Computac headquarters for processing on IBM 360 computers. The data is then massaged and the total number of magazines deliverable to the local dealer is apportioned to the respective newsstands.

Good but Not Great

The processed information, in the form of orders and invoices, is then transmitted back to the local distributors and printed out on Sycor printers attached to the terminals. At this point, the process is half over. Although Computac has managed to reduce the number of magazines returned to the local distributor, unused or unread copies still do come in.

When they do, they are collected from among all the newsstands and collated according to title and issue. This information is keyed into the terminal, transmitted to Computac's computers for processing and then printed out – producing a hard copy credit file for newsstand dealers.

Computac's clients account for approximately 20% to 25% of all periodicals distributed to newsstands in the U.S. and Canada, the firm stated.

Bulletin Compiles Blood Literature

BUFFALO, N.Y. – A biochemist here is using his privately owned computer to compose and distribute a unique weekly survey of hematological literature.

His publication – "Current Literature of Blood" – is read by subscribers on six continents.

Dr. Charles Bishop, director of the Biochemistry Laboratory at Buffalo General Hospital, has been operating his Blood Information Service and publishing his weekly bulletin for about seven years. A typical issue lists about 200 new scientific and medical papers on blood.

The computer he uses is a Varian 620/i, a small system that also includes a card reader, a teletypewriter terminal and a computer-controlled Selectric typewriter. Bishop owns all of his equipment, which is housed at the hospital.

In preparing his weekly listing, Bishop reviews some 50 scientific journals published in various languages from all over the world. Three colleagues survey scores of additional publications, by reviewing listings such as "Current Contents," a weekly digest that reproduces the contents pages of more than 1,000 life-sciences journals.

For each paper bearing on hematology, Bishop and his single assistant prepare punched cards showing all of the information needed to cite the paper in "Current Literature of Blood."

Articles Coded

Each citation shows the title and authors of the paper, the title and number of the publication in which the paper appeared, and the address to be used in requesting reprints. It also gives a code number that indicates the subjects covered in the paper. For example: If the code's first digit is a 2, the article deals with erythrocytes (red blood cells). The second digit might be a 6, signifying metabolism. So the number 2.6 would indicate a paper about red-cell metabolism. The length of the code number isn't fixed.

By Wednesday morning of each week, the cards are punched and sorted by code number. They are then read into the 620/i, which prints out the punched information on an IBM Selectric printer. As it is printing each citation, the system checks to see whether Bishop has indicated on the punched card whether he wants a reprint of the original paper. If so, a postcard requesting the reprint is printed on a TTY terminal.

The Selectric listing is taken to a nearby printer, where it is optically reduced to 80% of its original size, and reproduced by the Multilith process.

A typical issue comprises 16 pages (5-1/2 in. by 8-1/2 in.) plus covers. By Friday afternoon, the issue is in the mail.

Hospital Air Monitored

LONG BEACH, Calif. – A local hospital realizes it would defeat its purpose if it allowed, for example, patients with lung disease and respiratory problems to breathe improperly filtered air, so it has adapted a minicomputer to monitor and regulate the hospital's environment.

St. Mary Medical Center DP director Bob Day said a Johnson Control JC-80 now collects information including temperature, pressure and humidity and displays it on a central panel next to a predetermined norm that he programs into the mini.

Any malfunctions in the environmental systems that provide patient comfort – like air conditioning, filters and humidifiers – can be checked immediately if the computer prints out an unsual condition – a serious discrepancy between the predetermined and actual environmental readings, he explained.

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'All Systems Go' as Students Recycle Surplus Minicomputers

HAMMOND, Ind. – Computer science students at Purdue University-Calumet Campus have successfully recycled and put to work two surplus Minuteman D17B minicomputers.

According to Mr. A.V. Dundzila, assistant professor of computer sciences and manager of the school's Data Systems and Services Department, "For the cost of shipping, $100 for spare parts, $100 for documentation developed by a group at Tulane University and the cost of one trip to New Orleans, the machines are serving students as an excellent study-analysis and electronic design development-checkout system."

Conserving DP Resources

Arriving at the university crated inside Minuteman missile nosecones, with no software support, customary I/O devices or external supply units, the computers had to be powered and needed a custom console designed and constructed to interface with I/O devices.

Summer School

Leaning on documentation from an active Minuteman Computer Users Group (MCUG) at Tulane University, the student team spent one summer tracing wires, stripping components and adjusting memory read-write heads.

In the fall, the team began to put one minicomputer into operation, using the second for spare parts.

So far the students have succeeded in rewiring portions of the external cables to provide appropriate access points; designed and built the power supply unit, an air cooling unit and a console; and researched and documented the D17B's "principles of operation" and "programming techniques."

Under way but not yet completed are an octal and binary output display to function with the console to display register contents, a Flexowriter interface and systematic checkout procedures.

At the present time, according to Dundzila, the team can read in information using the console, display output on an oscilloscope and execute a number of simple programs. The team has also formulated a dozen or so project proposals for future implementation.

Real Nitty Gritty

"A key value to the team," Dundzila said, "was the opportunity to work with a nontrivial, high-quality, highly integrated system and to see it come to life.

"The manyfold technical requirements had to be traced back, identified at their source and uniquely satisfied," he said.

Among future applications for the D17B, students have suggested developing a modest D17B assembler running either on an IBM 360 or on the CDC 6500; continuing to study and document the D17B's architecture and develop a set of operational procedures; complete development of the octal and binary output display; use the D17B as a programmable calculator; use it as a telephone interface controller for the Nova time-sharing system; and interface the D17B with analog computers.

Dundzila said, "We feel we have our hands on an exciting, cost-effective system and recommend it for consideration at other institutions."

Interested parties should contact the Department of Health, Education and Welfare, Office of Surplus Property Utilization, 4452 North Building, Washington, D.C. 20201, for information on the surplus systems.

Newborns Coddled Before They're Born

CW West Coast Bureau

TORRANCE, Calif. – Physicians at Harbor General Hospital here are using computerized information to safeguard the lives of newborn children even before they are born.

And if plans progress for a new on-line system, the doctors will be able to get instant data on the status of a pregnancy and the risks to the fetus during and after labor.

It is hoped such an on-line system will drastically reduce the rate of illness and mortality among newborns as well as help the mother stay healthy.

Doctors at the hospital are now using information accumulated from 1,417 mothers and newborns to learn of possible dangers which may lie ahead during pregnancy, labor and the time following birth by comparing profiles of patients with problems with actual patients.

The data is now stored in an IBM 360/91 at the University of California, Los Angeles, Health Sciences Computing Facility.

The goal is to have a System/3/10 with an IBM 3275 display terminal in the labor and delivery suite, allowing doctors and nurses to key in their observations of a patient and then evaluate the patient's current status, developers said.

At birth, final observations would be entered regarding the delivery and after final information is input a hard-copy summary would become a part of the patient's file.

The minicomputer would be on-line to an IBM 360/91 at the UCLA Computing Network, but with a disk pack having routines evaluating information accumulated from the original 1,417 patients and additional cases.

An application has been made for a grant that would put the system on-line with a minicomputer, according to Dr. Calvin J. Hobel, assistant professor and chief of obstetrics, departments of obstetrics and gynecology and pediatrics.

New routines that would make the on-line system an early warning system for mothers and their fetuses are being developed by Jerry M. Pine, a biomedical engineer.

Aussies 'Plough' On to Efficiency

Special to Computerworld

SYDNEY, Australia – An agricultural machinery manufacturer, John Shearer and Sons of South Australia, has used a computer program developed from a theoretical study of plough design by Australian government research engineers to design a new disk plough.

The design allows the plough to operate under tougher conditions with less slip and with a lower fuel consumption than earlier ploughs, the 97-year-old firm said.

The computer-based study of weight distribution and the geometry of wheels, disks and drawbar had shown that in order to effectively balance the forces on the disks moving through the soil, the weight of the plough must be concentrated further toward the furrow wheels than in traditional designs.

The firm's engineers used the theoretical results to optimize the geometry and weight distribution of the new model. Extensive continent-wide tests showed that the 18- and 22-disk prototypes did a better job in hard and soft ground and on rough, uneven or hilly ground than older ploughs.

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Learn What You Need to Know About Contracting for Computers and EDP Support Services-In One Hard Lesson

A two-and-a-half-day seminar that can help you protect your EDP investment – and your system.

The response to our first ad on this seminar was excellent, and we've decided to go ahead with three seminars in the first part of 1974 Conducted by Roy N. Freed, the well-known expert in computer-related law, this unique seminar can give you the information you need to get good, effective contracts from the vendors that supply your EDP installation. And in an industry that's famous for its "promise them anything" attitude, this information can be invaluable. It can save you money. It can save you time. And, most important of all, it can help you protect your installation from disruptive discontinuities.

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You'll also receive a valuable reference notebook which will back up the information you'll receive at this meeting. *The notebook will include sample vendor contract forms.*

Roy N. Freed, a leader in this field.

Roy Freed has specialized in computer-related legal matters for many years. He has served as inside counsel for a major manufacturer of digital computers, and is currently engaged in private practice with a prominent Boston law firm.

He has authored many articles on the various legal aspects of computers – including "Computer Frauds – A Management Trap" *(Business Horizons)* and a book entitled "Computers and Law – A Reference Work." Mr. Freed will personally conduct the entire seminar.

Should you attend this seminar?

If your're involved in the purchase of EDP equipment or services, the answer is a resounding "yes." Whether you're a corporate counsel, contract administrator, DP manager, consultant or officer of a using firm, this seminar will pay for itself many times over. You just have to read the pages of *Computerworld* to realize how frequent supplier problems are – and how costly and disruptive they can be. This seminar can help you get what you want when you want it. It will help your company, your industry and you!

Times, places and cost

There is still one more seminar scheduled this spring.

May 22-24–St. Francis San Francisco

Total cost for the entire seminar, including the complete resource notebook, continental breakfasts, lunches and coffee breaks, is $295.00. Hotel rooms, if required, are not included.

Note: Enrollment must be strictly limited, and our other seminars were sold out. So don't wait until it's too late to enroll.

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Credit Union 'Rebels' With In-House, On-Line System

GROTON, Conn. – Submarine Base Credit Union, Inc. has declared its independence. Going it alone with in-house, on-line data processing, this $28.5 million credit union is directing more services to the peculiar needs of members, until now restricted by limited processing capabilities. And, it's costing little more than what the credit union had been paying.

For example, the credit union, which serves 36,400 members associated with the nuclear submarine base in Groton and the U.S. Coast Guard Academy in New London, has been able to extend its service hours. Members with payroll allotments may draw on their accounts immediately after payday, and as many as 18 possible loans can be charged to a single account, another first-time service.

Additionally, the credit union can contemplate 24-hour teller service and line-of-credit loans using checks. "We have dreams now that we couldn't even think of before," reported Ira B. Hillyer, the credit union's general manager.

What's making some of these dreams come true is a Digital Equipment Corp. Datasystem 500, a disk-oriented computer system that links teller and administrative terminals in the Groton main office and two branches on-line to a DEC PDP-11 processor containing the updated records of the credit union's entire membership. Programmed to identify member records by account number, each an individual data base, the system lends itself to central information file processing, an approach that enables the credit union to obtain on command the complete history of any one customer or any type of transaction.

Until the present system was installed, the credit union had gone almost as far as it could with on-line banking without considerable added expense and effort. On-line to a bank service center some 50 miles away since 1969, Sub Base Credit Union, according to Hillyer, had little control over hours, programming and product. Besides, the service company charged for every new account opened, an amount that added up considering the frequency of activity.

For the most part, the credit union accepted what the center offered, Hillyer said. Being one of just two credit unions among the center's 50 customers, this meant applications geared primarily to savings banks.

Another problem existed in keeping track of customers as the terminals formerly in use lacked I/O capabilities, he said. As a result, names and addresses of new accounts and changes were keypunched into the system from information forwarded to the center. This caused a particular hardship on Sub Base whose members, mostly military personnel, frequently changed their addresses every six months and sometimes as many as four times per year.

Making Waves

Repeated additions and deletions to the records also created a lot of paperwork. Every month, when Navy recruiting was at peak levels, the credit union was opening 900 new accounts and closing 400. Just to handle the load, the institution hired a clerk for every 1,200 new accounts. Even with the cutback in the Navy budget, the credit union is opening 600 new accounts and closing 400 every month.

The in-house system, designed and programmed by Financial Interactive Systems, Inc. (FIS), Milford, Conn., features large storage capacity and rapid access to data, both vital to credit union operations.

Modular in design, the system can grow in proportion to the credit union's needs without costly conversion or reprogramming, Hillyer said, adding he would like to see the day when four to six credit unions in the area join in a single on-line banking venture. "In effect, we have a plug-in system," he explained.

The installation is believed to be the first in on-line banking to use the DEC Datasystem 500/Commercial Data Management System (Mumps). First used in hospital recordkeeping applications, the Mumps software has since been adapted for businesses where large amounts of information must be stored, but kept current and immediately available on demand.

Mumps permits 32 simultaneous users to access a common data base and receive instant replies.

The system also restricts access only to authorized personnel, a feature which prompted Sub Base to establish multilevel controls that assign tellers, supervisors and officers different coded authorizations to tap the files.

Teller Job Eased

Though overall flexibility has been broadly expanded, the keyboard versatility of the window machines and step-through entry procedures have simplified teller functions, Hillyer said.

Most important, though, is the extent of each member's record and the ease with which it can be accessed, he continued. Besides the customer's name and address, both military and permanent, the disk contains his type of membership, military or defense contractor.

In addition, the file for each customer carries his Social Security Number, share balance and routine holds, keyed to clearance dates, for checks cashed or deposited. There also is a series of administrative holds to flag delinquent accounts and liens.

Where it took 30- to 60 seconds to post a routine transaction, longer if the teller had to wait for unposted items to be reported, the response time today is "insignificant, even during peak periods," Hillyer said. While the credit union averages 500 transactions per day, there were times when the number jumped to 3,000.

A CRT terminal on-line to the credit union's PDP-11 helps handle new accounts.

Now, loans and new accounts are set up through terminals elsewhere on the banking floor. New accounts, for example, are opened at a special desk equipped with a CRT terminal connected directly to the computer. The new member's complete profile is entered through the keyboard of the video display terminal without going through the teller. Similarly, loans are set up through a typewriter terminal in another corner, ensuring complete privacy.

File maintenance changes are made by a data department of four internal auditors. These changes are processed through back office terminals and appear on the day's transaction journal, a report of the activity posted to each account. Other reports include trial balances, delinquent loan listings, late payment notices and account confirmations.

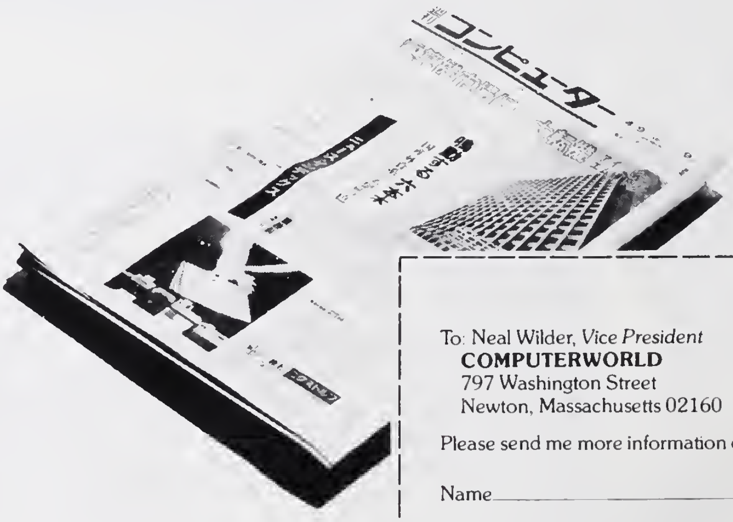
Eventually, the system will be used in processing the credit union's general ledger, provide 24-hour teller service and involve the institution in "cashless society" ventures, Hillyer said.

Who can sell computers in Japan?

Shukan.

In Japanese it's called *Shukan Computer*, and in English, it means "Computer Weekly." Whatever you call it, *Computerworld*'s new sister publication is an excellent vehicle for selling EDP products and services in the large and expanding Japanese EDP market. Here are some of the reasons why:

- **Shukan Computer** is a joint venture of *Computerworld* and Dempa Publications, the leading Japanese publisher of electronics information services. With the combined resources of the two companies, Shukan has the largest news gathering organization of its kind in the world.
- **Shukan Computer** is the only newsweekly for the fast-growing Japanese computer community
- Initial circulation is guaranteed at 35,000, divided about 80% to end-users and 20% to the computer industry. Circulation development methods currently under way are the same as those which gave *Computerworld* the highest paid circulation in its field in less than four years
- **Shukan** lets you in on the action in the world's fastest growing EDP market The Japanese Ministry of International Trade and Industry (MITI) has made the following 1976 forecast: 39,000 general-purpose systems installed, up from 11,237 in 1971; 11,000 minicomputers installed, up from 1,670 in 1971, and 3,000 industrial systems installed, up from 1,086 in 1971
- Is this growth likely? The latest census of general-purpose systems revealed that there were 14,806 systems installed as of September 1972, a one-year gain of 3,569 units and $911 million installed value, a growth of 31 7% and 23.1% respectively. And more than 50% of these new systems were American made
- It is true that there are import restrictions. But Japanese vendors and users can get permission to import almost anything they want and need As a result, 1972 imports were over $360 million.
- Advertising in Shukan is easy With *Computerworld* representatives across the U.S to assist you, it's easy to place space in Shukan. For a small fee, we can translate and type-set your ad from English to Japanese. To get more facts, just send in the coupon.



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CI Notes

2 Contracts Boost Sorbus

KING OF PRUSSIA, Pa. – Sorbus, Inc., an independent maintenance firm, has increased its annual volume by 25% with the addition of contracts with Ampex and DPA, Inc.

"Our agreement with Sorbus frees the memory products division to provide wider marketability of plug-compatible core, tape and disk systems," said Charles V. Anderson, Ampex vice-president.

Sorbus will handle maintenance for end-user customer engineering services of Ampex's memory products division and for equipment leased by DPA, Inc.

The DPA contract is a 10-year agreement and is expected to yield $2 million in first year revenue to Sorbus.

Sorbus will absorb most of the maintenance personnel of the two firms.

Medical Diagnostic Market Grows

NEW YORK – The market for medical diagnostic equipment, which totaled $355 million in 1973, is expected to grow at an annual rate of 9% through 1977, when it reaches $485 million, and 10% until 1982, when it will total about $725 million, according to a study by Frost & Sullivan.

In 1973, between 2% and 4% of a total $500 million in minicomputer shipments went into the medical marketplace, the study said.

The increasing role of minicomputers in analyzing multiple tests, including lung functions, should help boost the use of minis in the medical environment.

The cardiovascular field, the report said, "is in a new growth phase," spurred on by its "tie-in to the fast-growing patient-monitoring market."

Supershorts

Computer Automation, Inc. has delivered its 1,000th LSI-Type 2 minicomputer for use by a British bank as the controller for an automatic banking system produced by Chubb Integrated Systems, Inc.

– – –

Sycor, Inc. has signed a marketing, distribution and maintenance contract with Codevintec-Pacific, Inc., thereby expanding its international distribution network in the USSR.

– – –

Janus Marketing Co. will market Xytex automated tape library systems to the Federal Government.

– – –

Hewlett-Packard has increased salaries of all its full-time employees, except company officers, by 5%, affecting some 20,000 employees.

– – –

Interdyne Co. has appointed Data Graphics as its representative for Canada.

Supreme Court Review Denied

IBM Cedes 500 Documents to Justice

By a CW Staff Writer

WASHINGTON, D.C. – The Justice Department has finally procured certain IBM documents that have been the subject of a series of court skirmishes.

The U.S. Supreme Court rejected IBM's request to review a lower-court order requiring IBM to disclose certain documents that the Justice Department says it needs in its suit against IBM.

The Supreme Court said, "The appeal is dismissed for want of jurisdiction."

IBM said it made the documents available to the Justice Department over a week ago. By so doing, it avoided a contempt fine of $150,000 daily until it produced the documents.

Long Struggle

The Justice Department has been attempting to get its hands on 700 documents since April 1972. The documents were included in 1,200 papers submitted by IBM to Control Data Corp. during the suit brought by CDC against IBM.

IBM gave 500 papers to the Justice Department, but kept the rest, arguing it could keep them secret under attorney-client privilege, which had been inadvertently waived by submitting them to CDC.

Judge David N. Edelstein of the Federal District Court in New York rejected IBM's claim of independent waiver, and ordered the documents turned over to the government.

IBM appealed that order to the Supreme Court, which denied the appeal, thus referring the matter back to Edelstein.

He levied a daily fine of $150,000, or about 5% of IBM's daily revenues in 1972, to be paid by IBM until it turned over the documents. The contempt citation was stayed pending outcome of that appeal.

IBM, in addition to petitioning the Supreme Court, also took the matter to the Federal Appeals Court in New York. A panel of the appeals court vacated the district court ruling but five months later the full appeals court overturned the panel, saying it lacked jurisdiction in the dispute. This left the appeal to the Supreme Court as a last resort to allow IBM to keep the documents out of the hands of the government.

IBM Japan Discloses Finances; Called Move to Quiet Criticism

By Toni Wiseman
Of the CW Staff

TOKYO – In an unprecedented move, IBM Japan has revealed its financial position, showing total assets of $585.6 million as of Dec. 31, 1973. This figure is balanced by liabilities of $147.8 million.

By disclosing its finances, the firm is attempting to fend off criticism of its secretive management policy, according to *EDP/Japan Report*. The disclosure represents a move to forestall being accused of violating the ammended Commercial Code, which is now before the Japanese National Diet, the report said.

Critics, however, are complaining that the disclosure still makes it impossible to obtain precise knowledge of IBM Japan's business performance, and they are seeking the disclosure of a profit and loss statement, business report and general inventory and profit distribution report.

Until now, IBM Japan had never revealed its financial status, maintaining that its report was included in the IBM World Trade Corp. consolidated financial statements.

Indictment Possible

The disclosure was prompted by the Justice Ministry's announcement that it considered nondisclosure of corporate finances a violation of Article 283 of the Commercial Code, raising the possibility of IBM Japan being indicated, the report said.

In addition, a revision to the code currently under consideration would require all corporations with capital of $3.3 million or more to undergo accounting inspection. IBM's disclosure can therefore be considered an anticipatory move, the report said.

Another factor IBM considered is the specific investigation started by the Industrial Structure Council, an advisory body to the Ministry of International Trade and Industry (Miti), studying the relationship between IBM Japan's commercial practices and Japan's anti-monopoly law, EDP/JR said.

Net Worth Ratio

Key ratios pertaining to IBM Japan's management surpass those of Japanese firms, according to the newsletter, which reports IBM Japan's ratio of net worth to total capital as 74.8% compared with 28.9% for Fujitsu and 20.2% for the average of 428 Japanese manufacturing firms.

With such a high ratio, IBM Japan's interest payments and real liabilities are very small compared with Japanese firms, the report noted.

In addition to $147.8 million in liabilities, the firm shows $437.8 million in capital, of which more than 50% is in "surplus." This category includes voluntary reserve, profit brought forward from previous term and profit for the term. Also included in the capital section are legal reserves of $11.9 million.

New Memory Technologies Here?

Both Battelle Columbus Laboratories and IBM Research Division have projects under way in the area of memory technology.

Researchers at the Battelle Columbus Laboratories, have developed a concept for using organic materials for digital storage systems that they believe could lead to higher capacity optical memories than those currently in operation.

Work on the project is being performed at Nasa's Langley Research Center.

The Battelle concept is based on the reversible reaction triggered by a low-level laser, between the cis and trans-geometric isomers of selected organic materials. These molecules can be readily manipulated to produce phase holograms because the two isomers refract laser light differently, Battelle said.

Irradiating the material with light of one wavelength brings about a chemical reaction. This reaction causes a change in the index of refraction, creating a hologram. The hologram can be "erased" by irradiating it with light of a second wavelength, thus returning the material to its original isomeric form.

Each hologram would have the capacity for 100 million pieces of information per square centimeter. The holograms would be read with laser-light wavelength that would not cause an isomer interconversion.

Photosensitive Crystals

At IBM's Watson Research Center, Yorktown Heights, N.Y., work is proceeding on a phenomenon that occurs in photosensitive, piezoelectric crystals such as cadmium sulfide which at low temperatures permits storage of information at high density for long periods.

Information can be erased by shining light on the sample.

Researchers Norman S. Shiren, Robert L. Melcher, David K. Garrod and Thomas G. Kazyaka described the phenomenon in a recent paper.

Storage is accomplished in the piezoelectric crystal by a stable pattern of trapped electrons produced by interference between two input signals, they said. Information is read out by applying a signal at the same frequency as that of one of the original input signals.

This causes the sample to radiate a replica of the other input signal as an "echo."

Information is stored as an interference pattern between an information signal and a reference signal. One of the signals is acoustic and the other electrical.

The 8100. Have a painless disk operation.

Remote-site data entry operations that depend wholly on mainframe processing can be painful and costly. Sanders' intelligent 8100 Remote Batch Terminal System can offer quick relief. With its 5-million-byte disk storage and IN-FORM software, it can function off line as a virtually self-contained computer system using CRT's. It simplifies, controls, standardizes, improves turnaround time, reduces labor needs. From the leading company in the distributed data processing field with total hardware, software and maintenance resources. Sanders Data Systems, Inc., Daniel Webster Highway-South, Nashua, N.H. 03060. Call (603) 885-3727.

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International News

Japanese May Underestimate Worth of Terminal Development

By Shukan Computer
Special to Computerworld

TOKYO – One terminal equipment maker was lamenting: "The government, in order to promote the DP industry in 1974, has decided on a subsidy of $54 million for computers and $5 million for terminal equipment, but a subsidy smaller by a factor of 10 for terminals just doesn't make sense."

According to this explanation, the yield from terminals is higher than that from computers at present, and therefore, it would be better to spend government outlay on terminals, rather than fight an all-out war by subsidizing CPUs which have a poor chance of winning against imports.

Recent trends show terminals have much in their favor. For instance, IBM's sales show terminals far exceed CPUs.

IBM strongly resists having its own CPUs connected to peripheral-terminal equipment of other firms. There are many IBM users who have had an unpleasant experience trying to link other companies' Kanji printers and OCRs to IBM CPUs.

By contrast, Japanese CPU makers are completely permissive and rather close to being defenseless as a result of a delay in the development of domestic peripheral-terminal equipment.

Because Japanese computers were developed rapidly in a short time by concentrating all efforts on CPUs, there was little spent on peripheral-terminal equipment. Japan still does not make its own key-to-disk equipment.

In addition, because the Big Six companies put too many irons in the fire, a lot of gaps developed in the overall picture.

In the U.S. exclusive producers of peripheral-terminal equipment are growing steadily. Japan too, needs to establish a firmer division of labor of which CPU makers should make common use.

Undoubtedly CPUs and terminals are equally important. No one can accurately predict whether domestic CPU's can rival imports yet; sometimes the giant elephant is beaten by ants.

Use of Subsidy

Conversely, there is no guarantee that peripheral-terminal equipment will win either. However, it is understandable how the sharing of a $54 million subsidy for CPUs among several companies is not going to result in the most efficient use of funds.

The petty sum of $5 million terminals is also a point to ponder.

The valuable subsidy should be used effectively.

Univac Hikes UK Prices

LONDON – Univac has raised the prices on about 90% of its products in the UK.

The raises amount to about 10% on sale and rental of equipment and between 5% and 15% on the cost of maintenance, the firm said.

Foreign Orders & Installations

Selenia, a subsidiary of the Institute for Industrial Reconstruction in Rome, has ordered a Univac 1106 for scientific calculations, production requirements and administrative tasks.

The Canadian Meteorological Centre has installed a leased Cyber 76 from Control Data Corp.

Wales Gas has ordered six Sanders 810 clustered systems from Sanders Data Systems Ltd. to provide central control of customer appliances, spares and service, and engineering materials.

Sovaernets Materiel Kommando of the Danish Navy has placed an order for tactical data handling systems from Stansaab Elektronik AB, including a Censor real-time computer.

Emil Tengelmann Group, a German grocery store chain, has ordered three Univac 90/60 systems for billing, control of perishable food supply and inventory control.

Societe Comarfa, a French paper wholesaler, has ordered an NCR Century 50 for real-time management of the order book and sales and purchase ledger.

CNET, the French Government's material testing agency, has installed a Kybe Corp. CS-1600 magnetic tape certifying system.

Shell UK Ltd., London, has ordered a Univac 1110 valued at more than $7 million for processing work received over data lines for 10 remote batch terminals and over 50 teletypewriter terminals located throughout the UK and The Netherlands.

H. Foulks Lynch & Co. Ltd., a London accounting instruction firm, has ordered a Modular One transaction processing system from Computer Technology, Inc.

Kelly Douglas Co., Ltd., British Columbia, has ordered two Astros supermarket automation systems from MSI Data Corp.

Thais Seek DP Boost With Strong Committee

BANGKOK, Thailand – The good news here is that the Thai Government has reestablished its interdepartmental committee on computers, with strong status.

The DP industry, including local suppliers, expects 1974 to be Thailand's biggest year in data processing, according to the *Australian Financial Review*, which qualified that statement by saying, "Not that the local scene is anything but minute by world criteria, but it should mean that Thailand will accelerate its already healthy DP growth."

A recent estimate of the computer base here, put forth by Thavisikdi Thangsuphanich, assistant director, Data Processing Centre (Government) of Thailand, gives IBM 58.8% of the market, with Control Data and Univac each holding 11.8%. No other vendor is considered near these three.

Up to early this year, 39 computers were installed in Thailand, according to the newspaper, with a 256K IBM 370/145 at the Bangkok Bank being the country's largest system.

Annual DP expenditures are estimated at some $10 million for equipment and supplies.

Thavisikdi said the DP market is growing at 20% to 30% a year. He added that more than 100 companies are currently using service bureaus but he expects many of these to go in-house by 1978.

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Seven-Fold Growth Forecast for Remote Terminals

By Molly Upton
Of the CW Staff

NEW YORK – The remote data terminal market will undergo a seven-fold growth by 1982, resulting in a $6 billion annual business, according to a report from Frost & Sullivan, Inc.

During the next 10 years, over seven million units will be shipped with a value exceeding $39 billion, the report predicted.

Because of demands for greater intelligence in terminals, prices are expected to rise, despite new technologies and greater production volumes.

Although the market will grow sharply, there will be fewer manufacturers in the field. "The requirements to stay in business will even be strenuous for the largest manufacturers," the report cautioned.

The installed base of remote terminals will grow from 700,000 units in 1972 to 1.3 million in 1975 and 4.7 million in 1982, for a seven-fold increase.

Estimated at $3.6 billion in 1973, the installed base will be valued at $6.2 billion in 1975 and $24.4 billion by 1982, Frost & Sullivan said.

Factory shipments for the overall field of remote terminals is expected to jump from 223,000 units or $1.19 billion in 1973 to 417,000 units or $2.4 billion in 1975, and then 1.2 million units or $6.56 billion in 1982, according to the report.

The category of magnetic storage devices, with a 10-year growth rate of 15 to 20 times, is expected to grow faster than any other terminal segment.

The intelligent terminals will grow 12-fold; remote data stations and interactive displays, nine-fold; special function, eight-fold; low-cost data entry, six-fold; and audio response and interactive keyboard, five-fold, the report predicted.

Hurricane Market

Ranked in terms of value of factory shipments in 1982, the forecast shows intelligent terminals (or interactive data stations) to be the leader, with a volume worth $1.8 billion in 1982. The market will be "turbulent though dynamic throughout the Seventies," the report commented, noting the forecast is conservative.

The interactive display segment is second largest, with shipments worth $1.6 billion in 1982. "New designs and the entry of new manufacturers will keep this market in a turmoil for the next few years. The commitment to serve this market will be high, but the rewards could be great," the market research firm said.

Third is the area of interactive keyboards, with a total of $1.07 billion in 1982. The report noted that with mainframe manufacturers controlling this market, new entry will be almost impossible.

Furthermore, the "trend toward capturing data at the source will curtail the growth of this type of terminal," Frost & Sullivan said.

'Risks High'

The "special function" market is expected to grow to around $825 million in 1982. "These terminals require high investment designs for specific applications, where the risks are great and competition severe," the report noted.

Sixth in terms of value of shipments in 1972 is the magnetic storage sector, which should grow from $27 million in 1973 to $190 million in 1982.

New Designs by '75

The report predicted that "technology advances, especially LSI/MSI circuitry, will impact terminal design for a new round of terminals by the end of 1975.

"The major failure of independent data terminal manufacturers will primarily be caused by lack of understanding of marketing techniques for selling to the end user and the limited skills and resources available for system engineering and product integration," the report said.

Services in 'Leading Role' at CDC

ST. PAUL, Minn. – Data services are becoming the most important single offering of Control Data Corp., Chairman William C. Norris told stockholders recently.

Noting CDC has been in a gradual transition from emphasizing large computers, Norris said, "Today data services are taking over the leading role in our strategy supported by large computers and other products and services.

"Data services provide the most cost-effective and timely solution to a widening range of DP problems. One of our major objectives is to continue to develop specialized data services, which we call applications services, to help improve customer productivity in each of our major markets," he said.

In addition to providing enhanced profit potential, services add increasing stability and predictability to revenues, he observed. He forecast that in 1974 revenues from services and rented equipment will grow "to slightly more than half of total computer business revenues."

When combined with relatively predictable sales of peripheral equipment, he added, these revenues will amount to nearly three quarters of total volume.

Five years ago, in contrast, outright sales of computer systems accounted for two thirds of volume.

Long-range strategy in financial services, Norris said, calls for the development of business less susceptible to short-term fluctuations in money costs.

Pertec Piling Up Orders

CHATSWORTH, Calif. – Pertec Corp. continues to reap OEM orders for its tape and disk drives.

NCR has ordered tape drives valued at over $800,000 for use with its point-of-sale systems, while Vidar has ordered over $700,000 worth of tape drives and formatters for use with a telecommunications monitoring system.

Scidata, Inc. has ordered over $800,000 in tape drives for use in automated agricultural feeding systems.

Honeywell Equipment In Iran Increasing

TEHERAN, Iran – Honeywell computer equipment installed or on order in Iran totals $20 million, and $9 million worth will be installed this year in branches of the Iranian government.

Iranian officials estimate computer installations will rise 200% in 1974 from last year, and by 1980, 9,600 computer systems will be needed to meet the expanding needs of industry and government, they predicted.

Honeywell Chairman James H. Binger and Vice-President Allan L. Rudell met here recently with His Imperial Majesty the Shahanshah of Iran to review Honeywell's contributions to Iranian DP developments.

Honeywell is working with systems distributor Isiran to develop Iranian computer and electronics technology.

Iran now uses computers for national defense, government administrative services and private industry. Honeywell Series 6000 systems are being standardized for the Iranian armed forces.

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MEMBER COMPUTER DEALERS ASSOCIATION

Aussies 'Underutilizing' Telex Net

SYDNEY, Australia -- Users are underutilizing the Australian Post Office's Telex network, since only six computers are linked to it, attendees at a meeting of the New South Wales branch of the Australian Computer Society were told.

This despite that fact that there are over 12,000 Telexes installed in Australia and most companies have one or more.

Trevor Housley said it was clear that network planners don't adequately consider all three types of communications.

'No Doubt'

"There is no doubt that many more applications for the use of Telex in networks exist," he said in an article in *Computer Weekly*.

Users with low-volume communications could well use Telex rather than leased lines or a switched network, he said.

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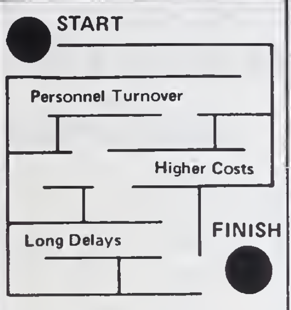

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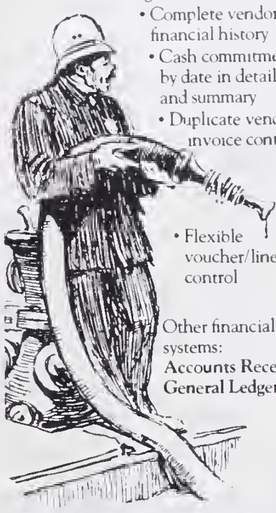

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Comtrol has terminated negotiations for its acquisition by Graphidyne, noting it has achieved its projected 20% increase in service revenues for the year. Earnings decreased, however, due primarily to the unprofitable operation of the Milwaukee Communications Control Division.

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Univac Helps Sperry Set Year Record

NEW YORK – Sperry Rand Corp., the last of the major mainframe makers to report its fiscal year results, weighed in with record earnings and revenues for the year ended March 31.

The Univac Division's revenues topped $1.1 billion and profits were higher than in the previous year for the ninth consecutive year.

Commercial orders for computers were up 18%, while the backlog at year end was 23% higher than at the same time a year ago, the firm said.

The corporation earned $112.6 million or $3.27 a share, up 25% from $90.1 million or $2.62 a share in 1973.

Revenues rose 17% to $2.61 billion compared with $2.23 billion in the previous year.

Although the firm expected a decline in fourth quarter order rates, "orders were up and there is no real evidence of a slowdown in capital goods spending," commented J. Paul Lyet, chairman and chief executive officer.

Fourth quarter earnings rose to $33.9 million or 98 cents a share compared with $29.2 million or 85 cents a share in the year ago period.

Revenues for the three months totaled $724.4 million compared with $635 million a year earlier.

Sperry's revenue gain of $384.2 million in 1974 nearly matched the previous record gain of $405.3 million last year. However, Lyet cautioned, the growth in revenues, as well as profits, should be judged in view of numerous external factors.

'Good Tailwind'

"Our overall performance in fiscal year 1974 was on target, but the worldwide capital goods boom gave us a good tailwind," he said.

"This was especially evident in the worldwide demand for computers, farm and hydraulic equipment products," he added.

Sperry's backlog was $1.73 billion at year end, 24% above that of last year.

All of Sperry's other units, except the electric shaver division, reported increases in revenues. The office systems and machines unit showed a "modest operating profit" compared with a loss last year.

"We are entering fiscal 1975 with a record backlog," Lyet said, "and we expect to see continuing new order strength. These factors, coupled with our internal cost control and new product programs, make us optimistic about fiscal year 1975.

"However, shortages of materials and components and inflation continue as the principal short-term concerns of the company," he said.

"In the long run, the end of wage and price controls should alleviate the shortages. We expect the elimination of controls in the U.S. will exert a settling influence on the business and economic climate," Lyet said.

Recent Reports of Earnings Rise Confirm Strength of Mainframers

By Molly Upton

Of the CW Staff

NEWTON, Mass. – The recent report from Univac, the last of six big mainframers to distribute a recent earnings statement, confirms the trend spotted earlier of strength throughout that segment of the industry.

Although some firms may have had individual reasons for their marked improvements over the corresponding quarter a year ago, the overall impression is that the mainframe business is where the action is, despite the demise of Memorex's CPU effort.

All firms did not break down their lease/purchase ratios, or changes therein, but IBM's situation of a higher level of outright purchases than a year ago, doubtless due to 370 shipments, may have applied to other firms as well.

In addition, foreign business is becoming increasingly important to mainframers as well as to the entire industry.

At NCR, domestic orders for the year to date are behind last year's pace, although foreign business continues to set new records, the firm said.

IBM's World Trade is known to have a good track record in hiking its contributions to the firm's earnings.

Records Abound

Records abounded, with Burroughs, Honeywell and NCR all reporting record first quarters. Although Control Data Corp. was not in this category, and in fact saw a decline in overall earnings, income from its computer segment increased over the previous year.

The company's financial arm was the culprit in the drop in earnings.

For those who like to play percentages, NCR has to be considered a winner, with earnings rising 62% above those of the 1973 first quarter, resulting largely from cost-cutting measures effected during the year. NCR's computer division, which discovered profitability during 1973, continued to operate in the black.

Revenues at NCR rose only 5%. The marketing reorganization was cited as the reason for the small increase in revenues in the U.S.

At Honeywell, the percentage gain in earnings outstripped revenues 15% to 11% compared with figures of the year-ago period.

However, at Burroughs the difference was even larger, with earnings rising 31% above those of a year ago, while revenues rose 10%.

The earnings picture at Sperry's Univac Division improved in the year ended March 31, and revenues topped $1.1 billion. Orders were up 18%.

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Arthur D. Little is now inviting subscriptions to its confidential study of U.S. computer output developments. Designed to aid planners and investors in identifying and evaluating new competitive and market opportunities, the study will include hardware, forms, and supplies, covering: *computer impact and non-impact printers and plotters, computer output microfilm systems, electronic displays, and voice response devices.*

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Study results will be presented orally in June, 1974, and will be available subsequently in written form. The cost is $2,500 per subscriber.

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Revenue	11,130,488	6,933,340
Earnings	2,050,897	1,376,000
9 Mo Shr	1.18	.65
Revenue	29,400,253	6,110,779
Earnings	5,675,300	3,150,000

DATA DISC
Three Months Ended March 29

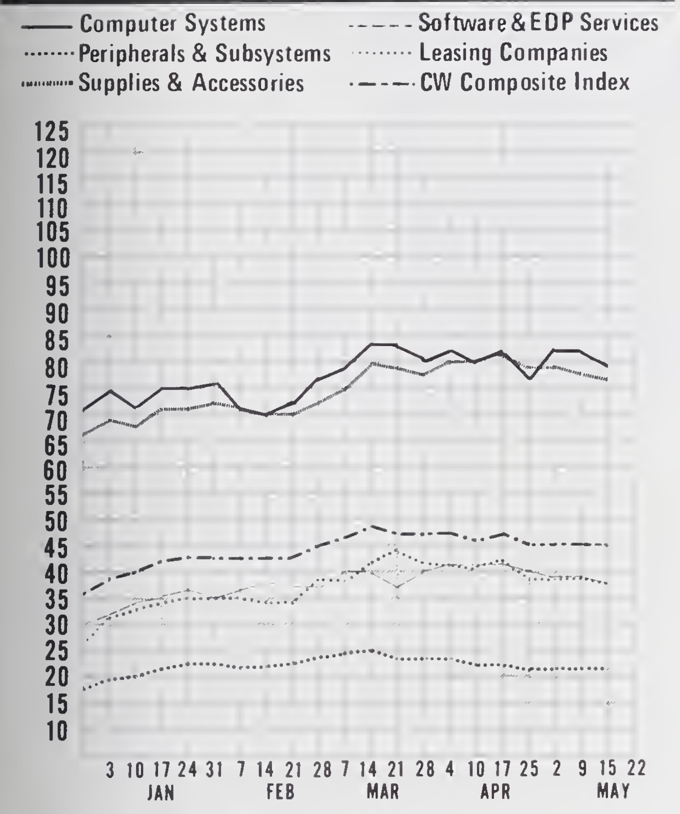
	1974	1973
Shr Ernd	$.17	$.18
Revenue	2,384,990	2,539,835
Earnings	175,362	190,112

ADVANCED MEMORY SYSTEMS
Three Months Ended March 29

	1974	a1973
Shr Ernd	$.11	$.19
Revenue	9,075,700	7,921,700
bSpec Cred	102,500	175,300
Earnings	213,800	365,200
6 Mo Shr	.13	.48
Revenue	16,450,700	14,592,000
Spec Cred	b117,500	c546,300
Earnings	244,800	914,200

a-Restated to include operations of Computer Microtechnology, Inc. b-From tax credit. c-Includes tax credit and $108,000 from renegotiation of capitalized lease obligations.

COMPUTERWORLD Computer Stocks Trading Indexes



APPLIED MAGNETICS
Three Months Ended March 31

	1974	1973
Shr Ernd	$.10	$.14
Revenue	15,745,000	11,483,000
Earnings	423,000	603,000
6 Mo Shr	.15	.24
Revenue	28,528,000	21,872,000
Earnings	624,000	1,028,000

The above results include operations of Trendata Corp., acquired Feb. 28, 1973, on a purchase basis.

GOULD
Three Months Ended March 31

	1974	1973
Shr Ernd	$.94	$.75
Revenue	191,562,000	160,647,000
Earnings	8,288,000	6,377,000
9 Mo Shr	2.55	2.05
Revenue	549,241,000	441,049,000
Earnings	21,916,000	17,240,000

DATA DOCUMENTS
Three Months Ended March 31

	1974	1973
Shr Ernd	$1.77	$.70
Revenue	13,069,169	9,258,728
Tax Cred	26,004	23,785
Earnings	828,345	328,708
6 Mo Shr	2.90	1.22
Revenue	24,068,116	17,106,316
Tax Credit	65,117	35,364
Earnings	1,361,236	570,803

TEXAS INSTRUMENTS
Three Months Ended March 31

	1974	1973
Shr Ernd	$1.09	a$.83
Revenue	375,479,000	289,008,000
Earnings	24,754,000	18,864,000

a-Adjusted to reflect a two-for-one stock split in May 1973.

SINGER
Three Months Ended March 31

	1974	1973
Shr Ernd	$.91	$1.18
Revenue	661,100,000	576,700,000
Earnings	16,700,000	20,900,000

On a fully diluted basis, share earnings were 88 cents in 1974 and $1.13 in 1973.

BUNKER RAMO
Three Months Ended March 31

	1974	a1973
Shr Ernd	$.32	$.25
Revenue	76,923,081	64,357,889
Spec Chg	.....	b640,471
Earnings	2,473,807	2,220,402

a-Restated to reflect accounting changes for translation of foreign currencies and depreciation. b-From accounting change.

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Computerworld Stock Trading Summary

TRADE*QUOTES

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		PRICE 1973-74 RANGE (1)	CLOSE MAY 15 1974	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	49-126	105 1/8	-2 1/4	-2.0
N	COLLINS RADIO	16- 26	24 3/4	0	0.0
O	COMPUTER AUTOMATION	5- 20	11 5/8	- 3/8	-3.1
N	CONTROL DATA CORP	30- 62	30 1/2	- 1/2	-1.6
N	DATA GENERAL CORP	28- 49	33 1/2	0	0.0
O	DATAPOINT CORP	10- 21	13 1/4	-1	-7.0
O	DIGITAL COMP CONTROL	2- 6	3 5/8	+ 1/8	+3.5
N	DIGITAL EQUIPMENT	73-121	116 1/2	+1 7/8	+1.6
N	ELECTRONIC ASSOC.	2- 9	2 1/4	- 1/8	-5.2
A	ELECTRONIC ENGINEER.	6- 14	9 1/2	0	0.0
N	FOXBORO	23- 48	35	-1 7/8	-5.0
O	GENERAL AUTOMATION	22- 55	39 1/4	- 1/2	-1.2
O	GRI COMPUTER CORP	1- 3	1 3/8	0	0.0
N	HEWLETT-PACKARD CO	70- 99	84 7/8	-4 1/8	-4.6
N	HONEYWELL INC	68-139	74	-5 3/4	-7.2
N	IBM	222-340	222 3/8	-8 1/8	-3.5
O	INTERDATA INC	7- 22	21 3/8	+1 1/2	+7.5
O	MICRODATA CORP	2- 10	3 1/8	- 1/2	-13.7
N	NCR	27- 46	35 1/4	-1 3/8	-3.7
N	RAYTHEON CO	22- 39	34 3/8	- 7/8	-2.4
N	SINGER CO	31- 74	30 7/8	-1 5/8	-5.0
N	SPERRY RAND	36- 56	37 7/8	-1 3/4	-4.4
A	SYSTEMS ENG. LABS	1- 8	1 5/8	- 1/4	-13.3
N	TEXAS INSTRUMENTS	83-138	110 3/4	-2 1/2	-2.2
O	ULTIMACC SYSTEMS INC	1- 11	1 1/2	0	0.0
N	VARIAN ASSOCIATES	10- 20	9 3/4	- 3/8	-3.7
N	WANG LABS.	12- 34	11 5/8	-1	-7.8
N	XEROX CORP	106-169	114 3/4	-1 1/4	-1.0
	LEASING COMPANIES				
A	BOOTHE COMPUTER	1- 5	1 1/8	0	0.0
O	BRESNAHAN COMP.	1- 2	2 1/8	0	0.0
O	COMDISCO INC	3- 17	3 3/8	- 1/8	-3.5
A	COMMERCE GROUP CORP	3- 6	4 1/2	- 1/2	-10.0
O	COMPUTER EXCHANGE	1- 1	1/4	0	0.0
A	COMPUTER INVSTRS GRP	2- 8	2 1/8	+ 1/8	+6.2
O	COMP. INSTALLATIONS	1- 2	1	- 1/8	-11.1
M	DATRONIC RENTAL	1- 3	1 3/8	0	0.0
A	DCL INC	0- 3	1/2	+	+12.5
N	DPF INC	3- 9	3 3/4	+ 1/8	+3.4
O	EDP RESOURCES	1- 3	3 1/4	0	0.0
A	GRANITE MGT	2- 6	1 1/2	- 3/8	-20.0
A	GREYHOUND COMPUTER	3- 6	3 5/8	0	0.0
A	ITEL	4- 12	4 3/4	- 1/4	-5.0
N	LEASCO CORP	8- 18	10 1/8	0	0.0
O	LEASPAC CORP	1- 8	1 1/4	0	0.0
O	LECTRO MGT INC	1- 2	1/2	0	0.0
O	NRG INC	3- 15	3 3/4	- 1/4	-6.2
A	PIONEER TEX CORP	3- 10	3 1/8	- 1/8	-3.8
A	ROCKWOOD COMPUTER	1- 3	3/4	0	0.0
N	U.S. LEASING	15- 36	14 3/4	- 3/4	-4.8
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1 1/8	0	0.0
A	APPLIED DATA RES.	2- 4	2 1/2	- 1/8	-4.7
O	APPLIED LOGIC	1- 3	3/8	0	0.0
N	AUTOMATIC DATA PROC	29- 94	29	-3 7/8	-11.7
O	BRANDON APPLIED SYST	1- 1	1/4	0	0.0
O	CENTRAL DATA SYSTEMS	3- 9	4	0	0.0
O	COMPUTER DIMENSIONS	1- 5	2	0	0.0
O	COMPUTER HORIZONS	1- 6	2 1/4	0	0.0
O	COMPUTER NETWORK	1- 5	1 3/8	0	0.0
N	COMPUTER SCIENCES	2- 6	2 7/8	+ 1/8	+4.5
O	COMPUTER TASK GROUP	1- 2	1/2	0	0.0
O	COMPUTER TECHNOLOGY	1- 3	1/2	0	0.0
O	COMPUTER USAGE	3- 9	2 7/8	0	0.0
O	COMPRESS	1- 2	3/8	0	0.0
O	COMSHARE	2- 9	2 3/4	0	0.0
N	CORDURA CORP	2- 15	2 1/2	+ 1/8	+5.2
O	DATATAB	1- 4	1 1/4	0	0.0
A	ELECT COMP PROG	1- 2	1/4	0	0.0
N	ELECTRONIC DATA SYS.	12- 56	16	- 1/8	-0.7
O	INFONATIONAL INC	1- 2	1/2	0	0.0
O	INFORMATICS	2- 7	6 3/4	0	0.0
O	I.O.A. DATA CORP	1- 1	3/8	0	0.0
O	IPS COMPUTER MARKET.	1- 5	3/4	- 1/8	-14.2
O	KEANE ASSOCIATES	2- 5	3 1/2	0	0.0
O	KEYDATA CORP	3- 12	3 3/8	- 7/8	-20.5
O	LOGICON	2- 7	3 1/4	- 1/8	-3.7
A	MANAGEMENT DATA	1- 5	1 1/2	- 3/8	-20.0
O	NATIONAL CSS INC	18- 42	25 1/2	+1	+4.0
O	NATIONAL COMPUTER CO	1- 1	3/8	0	0.0
O	NATIONAL INFO SRVCS	1- 2	1/8	0	0.0
P	ON LINE SYSTEMS INC	12- 28	31 1/4	+ 7/8	+2.8
N	PLANNING RESEARCH	2- 7	2 1/2	- 1/4	-9.0
O	PROGRAMMING METHODS	17- 25	17	0	0.0
O	PROGRAMMING & SYS	1- 1	7/8	0	0.0
O	RAPIDATA INC	2- 24	2 1/2	0	0.0
O	SCIENTIFIC COMPUTERS	1- 3	7/8	0	0.0
O	SIMPLICITY COMPUTER	1- 4	1	0	0.0
O	TCC INC	1- 1	1/4	0	0.0
O	TYMSHARE INC	6- 13	11 1/4	+ 1/2	+4.6
O	UNITED DATA CENTER	3- 6	3 1/4	0	0.0
A	URS SYSTEMS	2- 8	2 3/4	- 1/8	-4.3
N	WYLY CORP	3- 11	3 3/8	- 1/8	-3.5
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	7- 34	6 3/4	- 1/4	-3.5
O	ADVANCED MEMORY SYS	4- 23	3 1/2	- 1/4	-6.6
N	AMPEX CORP	3- 7	3 3/4	+ 1/8	+3.4
O	ANDERSON JACOBSON	2- 6	2 3/4	0	0.0
O	BEEHIVE MEDICAL ELEC	3- 10	3 3/4	+1 1/4	+50.0
A	BOLT.BERANEK & NEW	6- 12	7	0	0.0
N	BUNKER-RAMO	6- 18	6 1/4	0	0.0
A	CALCOMP	5- 16	9 3/4	- 5/8	-6.0
O	CAMBRIDGE MEMORIES	8- 17	10 5/8	- 5/8	-5.5
O	CENTRONICS DATA COMP	13- 38	21 3/4	-1 1/4	-5.4
O	CODEX CORP	8- 19	11 1/4	- 3/4	-6.2
O	COGNITRONICS	1- 3	1 1/4	0	0.0
O	COMPUTER COMMUN.	1- 4	7/8	+ 1/8	+16.6
A	COMPUTER EQUIPMENT	1- 3	1 1/2	- 1/8	-7.6
O	COMPUTER MACHINERY	4- 13	4 1/4	+ 1/8	+3.0
O	COMPUTER TRANSCEIVER	1- 6	1	- 1/8	-11.1
N	CONRAC CORP	13- 32	18 3/4	-1 1/8	-5.6
O	DATA ACCESS SYSTEMS	1- 3	1 7/8	0	0.0
O	DATA 100	9- 18	10 1/8	- 1/2	-4.7
A	DATA PRODUCTS CORP	2- 5	3 3/4	+ 1/8	+3.4
O	DATA RECOGNITION	1- 3	1/2	0	0.0
O	DATA TECHNOLOGY	1- 5	3 1/4	0	0.0
O	DECISION DATA COMPUT	6- 40	8	- 7/8	-9.8
O	DELTA DATA SYSTEMS	1- 1	3/4	- 1/8	-14.2
O	DI/AN CONTROLS	1- 4	1 3/8	+ 1/8	+10.0
N	ELECTRONIC M & M	3- 6	2 7/8	- 1/8	-4.1
O	FABRI-TEK	2- 5	2 1/4	- 1/4	-10.0
O	GENERAL COMPUTER SYS	3- 9	2 3/4	0	0.0
N	GENERAL ELECTRIC	48- 76	50 1/8	- 3/4	-1.4
N	HAZELTINE CORP	4- 9	4 5/8	- 1/8	-2.6
O	INFOREX INC	2- 23	2 3/8	0	0.0
O	INFORMATION DISPLAYS	1- 2	1/2	+ 1/8	+33.3
O	INFORMATION INTL INC	8- 15	10 3/4	+ 3/4	+7.5
A	LUNDY ELECTRONICS	3- 9	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/4	0	0.0
N	MEMOREX	2- 19	4 1/8	- 3/8	-8.3
A	MILGO ELECTRONICS	11- 28	10 7/8	-1 5/8	-13.0
N	MOHAWK DATA SCI	2- 13	2 3/4	0	0.0
O	ODEC COMPUTER SYST.	2- 6	2 1/4	+ 1/2	+28.5
O	OPTICAL SCANNING	2- 8	3 3/4	+ 3/8	+11.1
O	PERTEC CORP	3- 8	3	0	0.0
O	PHOTON	3- 7	3 3/4	0	0.0
A	POTTER INSTRUMENT	2- 9	3 1/4	- 1/8	-3.7
O	PRECISION INST.	2- 6	1 3/4	0	0.0
O	QUANTOR CORP	4- 10	4 3/4	- 3/4	-13.6
O	RECOGNITION EQUIP	2- 8	3 5/8	0	0.0
N	SANDERS ASSOCIATES	4- 18	4 1/4	+ 1/8	+3.0
O	SCAN DATA	1- 6	1 1/2	- 1/8	-7.6
O	STORAGE TECHNOLOGY	11- 34	13 1/8	- 7/8	-6.2
O	SYCOR INC	7- 20	7 1/2	-1	-11.7
O	TALLY CORP.	2- 14	3 3/8	- 1/4	-6.8
O	TEC INC	5- 9	4 1/2	0	0.0
N	TEKTRONIX INC	30- 55	42 1/4	-1 3/8	-3.1
N	TELEX	3- 8	3 1/4	+ 1/2	+18.1
O	WANGCO INC	7- 13	11 3/4	0	0.0
O	WILTEK INC	5- 18	5	- 1/4	-4.7
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	4- 8	5 1/2	0	0.0
A	BARRY WRIGHT	5- 13	5 3/8	- 3/4	-12.2
O	CYBERMATICS INC	1- 3	1 1/4	0	0.0
A	DATA DOCUMENTS	17- 50	43	-4 3/4	-9.9
O	DUPLEX PRODUCTS INC	6- 11	11	+2 3/8	+27.5
N	ENNIS BUS. FORMS	5- 8	5 1/2	- 1/2	-8.3
O	GRAHAM MAGNETICS	7- 20	8 1/4	0	0.0
O	GRAPHIC CONTROLS	7- 12	10	+ 1/4	+2.5
N	3M COMPANY	68- 91	72	-1 3/8	-1.8
O	MOORE CORP LTD	48- 65	50 1/4	-2	-3.8
N	NASHUA CORP	32- 58	33	+ 1/4	+0.7
O	REYNOLDS & REYNOLDS	24- 51	24 1/2	- 1/2	-2.0
O	STANDARD REGISTER	11- 20	15	0	0.0
O	TAB PRODUCTS CO	7- 23	6 1/2	0	0.0
N	UARCO	15- 23	19 5/8	- 3/4	-3.6
A	WABASH MAGNETICS	5- 8	5 1/2	- 1/8	-2.2
N	WALLACE BUS FORMS	14- 26	21	+ 1/8	+0.5

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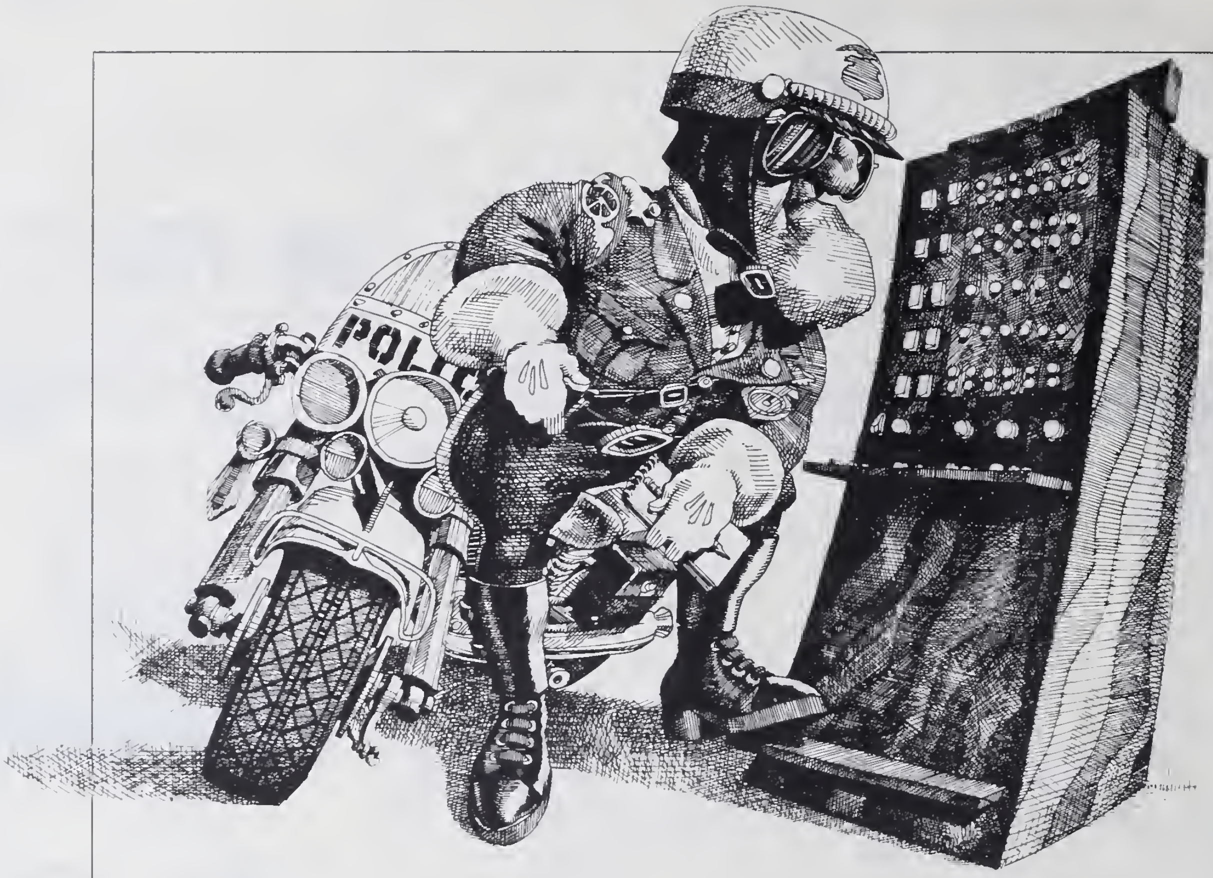

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